

## Attachment C

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Evaluation of Stratigraphy above the E-Clay Tulare  
Lake Bed MUN/AGR De-Designation Area  
(including CD)

## EVALUATION OF STRATIGRAPHY ABOVE THE E-CLAY TULARE LAKE BED AREA MUN/AGR DE-DESIGNATION

Prepared for: Tulare Lake Basin Water Storage District  
Tulare Lake Drainage District

Date: November 21, 2014

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### 1. Background

Under Central Valley Salinity Alternatives for Long-Term Sustainability (CV-SALTS) and requirements for completion of Central Valley Salt and Nitrate Management Plans, a portion of the Tulare Lake Bed groundwater basin was identified as an area that may meet exemption criteria set forth in the state's Safe Drinking Water Policy (SDWP), Resolution No. 88-63. Through CV-SALTS, a report was submitted to the Regional Water Quality Control Board, Central Valley Region, by the Tulare Lake Drainage District (TLDD) and Tulare Lake Basin Water Storage District (TLBWSD) providing a technical basis for de-designation, or delisting, of municipal or domestic (MUN) and agricultural (AGR) beneficial uses from the portion of the Tulare lake Groundwater Subbasin (Department of Water Resources Bulletin 118 2003 Update, Subbasin 5-22.12) that underlies the Tulare Lake Bed. The report, entitled *Technical and Regulatory Evaluation of MUN and AGR Beneficial Uses in the Tulare Lake Bed Area*, February 12, 2014, was prepared by Kenneth D. Schmidt and Associates (KDSA) with regulatory and technical analysis by CDM Smith and Summers Engineering. Informal comments on this technical report were made by the Central Valley Water Board dated May 12, 2014. **Figure 1a** is a location map showing original and recommended horizontal delisting boundaries for the Tulare Lake Bed area by KDSA (2014); **Figure 1b** shows the KDSA study subareas. On all figures for the current technical memorandum, the historic lake bed outline is shown and based on an 1873 compilation from the Maps of the Geological Survey of California and Special Survey and Examinations (see references).

The SDWP specifies that all surface and ground waters of the state are considered suitable, or potentially suitable, for municipal or domestic water supply and should be so designated by the Regional Boards. The KDSA (2014) report evaluates and proposes delisting boundaries using exceptions under the SDWP meeting the following two criteria applicable to groundwater. The exceptions are:

*1. Surface and ground waters where:*

- a. The total dissolved solids (TDS) exceed 3,000 mg/L (5,000 µS/cm, electrical conductivity) and it is not reasonably expected by Regional Boards to supply a public water system, or*

- b. There is contamination, either by natural processes or by human activity (unrelated to the specific pollution incident), that cannot reasonably be treated for domestic use using either Best Management Practices or best economically achievable treatment practices...*

The KDSA (2014) study area was based on an initial delineation of horizontal boundaries encompassing the Tulare Lake Bed as distinguishable by its topography, flooding susceptibility, soil and groundwater characteristics, and geologic features. The area was subdivided into subareas consisting of a Central Subarea absent of water supply sources and predominated by thick clay beds, and North, South, West, and East subareas along the fringes where some development of groundwater supply occurs, notably for cities and small communities as well as agricultural uses (see **Figure 1b**).

The KDSA (2014) evaluation provided a recommended horizontal delisting boundary. The vertical limits correspond to the occurrence of the A-Clay. The A-Clay is the uppermost lacustrine deposit outlined by Croft and Gordon (1968) in a descending sequence of older lacustrine deposits termed A-F Clays.

## 2. Purpose of Current Technical Memorandum

The current technical memorandum was prepared to supplement the evaluation by KDSA (2014) and support horizontal and vertical delineation of MUN and AGR boundaries in the Tulare Lake Bed area. The current work also addresses informally transmitted comments by the Central Valley Regional Board on May 12, 2014, which consisted of eight technical issues calling for better support for the proposed delisting. Issues 2 and 3 in the Board's comments related to insufficient delineation of horizontal and vertical delisting boundaries. Under Issue 2, the Board noted that sedimentary deposits depicted in geologic cross sections did not correspond to specific horizontal boundaries and that pumping adjacent to the recommended boundary could induce groundwater flow from delisted areas. Under Issue 3, the Board noted that the recommended A-Clay vertical delisting boundary is not present at all locations within the study area and, where present, cannot always be distinguished from other clays.

The current technical memorandum supports the KDSA (2014) boundary recommendations through a detailed stratigraphic interpretation using additional well control not available at the time of the study.

## 3. Method

The current evaluation is based on examination of well logs and construction of geologic cross sections to develop stratigraphic relationships and limits of sand units that might serve MUN and AGR beneficial uses in the area. A detailed representative cross section was produced to show these relationships and is presented in this technical memorandum. The cross section depicts conditions in the KDSA (2014) North and East subareas and extends into the Central Subarea, which is known for the occurrence of thick lacustrine clay units. Sources of well logs were KDSA (2014), recent geophysical logs (e-logs) from boreholes in the northern Tulare Lake Bed area, and oil and gas logs obtained from the state Division of Oil, Gas and Geothermal

Resources. The recent e-logs significantly improved correlation of sand beds that potentially require protection under the SDWP. **Figure 2** shows the delisting boundaries and well control from KDSA (2014), plus recent e-logs and additional oil and gas logs used in the current evaluation. The recent e-logs used are attached for reference (see enclosed **Logs**). Additional oil and gas well logs that were not part of the KDSA (2014) report are included on electronic disk.

#### 4. Discussion of Results

The stratigraphic evaluation within the original and recommended delisting areas delineated by KDSA (2014) is presented in the following sections. The evaluation focuses on the occurrence and distribution of sand units above the E-Clay as a basis for defining limits of potential water supply sources. The first section discusses the Tulare Lake Bed lacustrine clay units, including the E-Clay, to frame the subsequent discussion of interbedded sands at the Lake Bed fringes that are potential beneficial water supply sources.

##### 4.1 Lacustrine Clay Units

The presence of lacustrine clay units in the San Joaquin Valley has been known since the early 1900s. The most wide-spread and distinctive unit was initially termed the Corcoran Clay of the Tulare Formation and is present in the subsurface beneath most of the western and central parts of the San Joaquin Valley. Early groundwater studies near the Tulare Lake Bed delineated the Corcoran diatomaceous clay (Davis and Poland, 1957; Wood and Davis, 1959). Croft and Gordon (1968) delineated the lacustrine clay beds in the Hanford-Visalia area encompassing the northern area of the Tulare Lake Bed. Their study defined the lacustrine/marsh beds in a descending sequence of A to F clays. The E-Clay was in part equivalent to the Corcoran Clay member of the Tulare Formation of the earlier studies.

Croft and Gordon (1968) mapped the extent of the lacustrine clays (A-F) in the Hanford-Visalia area showing structure contour elevations on the top or bottom of each clay unit. Their cross-sections A-A' and B-B' show inter-fingering and pinching out of sand beds into the thick lacustrine clay beds beneath the Tulare Lake Bed corresponding to the Central Subarea by KDSA (2014) and this evaluation. The Croft and Gordon (1968) cross sections and structure contour map show a lack of distinction between the A-F units in this area where the lacustrine clays extend up to 3,000 feet in depth.

In a study of the entire southern San Joaquin Valley, Croft (1972) expanded the A-F lacustrine clays across a larger area with cross-sections C-C' and G-G' showing adjacent sand units inter-fingering and pinching out into the undifferentiated thick lacustrine clays above the E-Clay unit. Croft (1972) also presented structure contour maps on the A-, C-, and E-Clays in the southern San Joaquin study area. Subsequently, a study of the entire Central Valley by Page (1986) showed similar inter-fingering and pinch-out patterns of the sand units with the lacustrine clay beneath the Tulare Lake Bed.

Consistent with previous studies, the current evaluation found that the more distant from the lake margins, the more difficult it is to distinguish stratigraphic horizons using geophysical logs. Within the thick, very low resistivity lacustrine clay sequence, only the E-Clay unit could



reliably be identified and correlated. As discussed below, the gamma ray curve may provide a means to correlate and separate the lacustrine clay units, but control is too limited for extensive mapping.

#### 4.2 Occurrence of Sands above the E-Clay

Recent e-logs from boreholes located mainly in the south half of Township 21 North, Ranges 21 and 22 East, and the north half of Township 22 North, Range 22 East were examined for stratigraphic markers and correlations (see **Figure 2**). This area includes the vicinity of the City of Corcoran and corresponds to parts of the North and East Subareas evaluated by KDSA (2014).

Supplemented with older geophysical logs and drillers reports from water wells and oil and gas boreholes, geological cross sections were constructed in the northern Tulare Lake Bed area to generally assess occurrence and patterns of geologic units that may either isolate or interconnect groundwater sources, which is of concern in the delisting process. The work focused on the geologic relationships above the E-Clay. Although in most areas there are no water supply wells completed above the E-Clay, wells targeting deeper freshwater sands provided e-logs that permitted delineation of features above the unit.

The central portion of the Tulare Lake Bed area is characterized by up to 3,000 feet of clay formation with indistinguishable features on electric geophysical logs. As noted by KDSA (2014), sands occur along the fringes in the North and East study subareas, which may provide sources of supply under MUN and AGR beneficial uses and would need to be excluded from the delisting boundaries. This investigation identified sands in these areas from recent geophysical logs, which are informally termed as the 'V' Sequence or 'V' Sands, to delineate their interpreted stratigraphic relationship. These sands are interbedded with the lacustrine clay units described above.

#### 4.3 Evaluation of 'V' Sequence

The evaluation of the 'V' Sequence consisted of detailed review of recent e-logs and selected older e-logs to construct structure maps and geologic cross sections. A representative cross section extends over eight miles in the KDSA (2014) North and East subareas. The east-west cross section reflects geophysical characteristics of geologic beds to a depth of about 800 feet, or -600 feet elevation. The alignment of the representative cross section was selected to reflect the depositional environments from the northern and eastern fringes into the central part of the Lake Bed.

Stratigraphic correlations were determined from e-logs based on the nature, character and variation of geophysical signatures for geologic beds encountered in boreholes. Observations were made on the thickness and number of beds. The representative Cross Section X-X' is shown on **Figure 3**. The location and well control for this cross section is shown on **Figure 4**. For each well on the cross section, the 16-inch normal resistivity curve (short normal) from the geophysical log is reproduced based on a normalization to an original drawing scale of 0.10 inch to 10 ohm-meter<sup>2</sup>/meter (the shorthand "ohms" is used to express resistivity values in this technical memorandum). In general, higher resistivity values represent coarse-grained, sedimentary geologic material of sands and gravels, with the lowest resistivity values

representing fine-grained, sedimentary material of silts and clays. In the southern San Joaquin Valley and elsewhere, water wells are screened in the higher resistivity beds of sand and gravel beds, which have characteristics conducive to successful water supply development. Observations of resistivity values for individual beds, or the range of values for a series of beds, were also made.

From observations on the number, thickness, and nature of the geologic beds, and their resistivity values, available well log control was examined for patterns in these parameters to construct and interpret work sections and the representative cross section, X-X' in **Figure 3**. Four areas are distinguishable from this evaluation based on consistent characteristics (i.e., thickness, nature, resistivity values) which define a sedimentary facies (i.e., general nature and characteristics). The facies are a reflection of the depositional environment in which the beds were formed, such as stream channels, alluvial fans/plains or lakes. The four areas of distinctive facies shown on Cross Section X-X' are from east to west: Alluvial Plain; Sandflat; Lake Margin; and Lake Bed. Each facies is described below:

#### Alluvial Plain Facies

At the east end of Cross Section X-X' (see **Figure 3**), the Alluvial Plain facies consists of numerous, thick sand beds with relatively high short normal resistivity. Resistivity values for these beds range from low 20s up to 50 ohms and are interbedded with some thin, low resistivity fine grained beds. A typical log for this facies is from Well 25H on Cross Section X-X' (see **Figure 3** and attached **Logs**). The interpreted depositional environment is a distal alluvial plain where streams and flood flows spread out, laying down lobes of sand as the gradient decreased towards the base level of the lake to the west.

About three miles further east outside the study area, available well control indicates that the Alluvial Plain facies exhibits even higher resistivity and is interbedded with lower resistivity beds. These characteristics possibly reflect a more fluvial or stream dominated alluvial plain with floodplain or soil horizons.

#### Sandflat Facies

To the west of the Alluvial Plain facies, the Sandflat facies is characterized by numerous, thin to thick, medium short normal resistivity sand beds which inter-bed and inter-finger with low resistivity lake clays, (see **Figure 3**). The short normal resistivity values of the sand beds range from the low 20s to the east decreasing westward to less than 15 ohms. The sands are divisible into four sand sequences separated by clay beds associated with high lake stands. A typical log for this facies is from Well 27N on Cross Section X-X' (see **Figure 3** and attached **Logs**).

The interpreted depositional environment of the Sandflat facies is where thin beds of sand were deposited as flow velocities decreased near lake base level and the ability to transport sand diminished. Possibly small alluvial, delta-like lobes may have developed and built out into the lake in this area. The sand beds can be seen to decrease westward with thickening interbeds of lake clays (see **Figure 3**). The western edge of the Sandflat facies is believed to mark the western extent of 'V' Sands that are of sufficient thickness and resistivity to be

potential targets for low to modest yields of groundwater to wells. The western edge of the Sandflat facies is interpreted as the demarcation point where lake or lacustrine deposition became dominant in standing waters.

#### Lake Margin Facies

The Lake Margin facies is characterized by thick, low resistivity, fine-grained lake clays. Short normal resistivity values are very low ranging from less than 5 ohms to 8 ohms. Interbedded with the lake clays are a few, thin sandy or silty clay beds with resistivity values of less than 10 ohms to less than 15 ohms. A typical log for this facies is from Well 30N on Cross Section X-X' (see **Figure 3** and attached **Logs**). Notably, these low resistivity beds can be stratigraphically correlated eastward to the sandy sequences of the Sandflat facies consistent with the interpreted depositional processes described above.

The depositional environment of the Lake Margin facies is standing water of the lake where fine-grained sediments of silt and clay settled. The few thin, slightly higher resistivity beds are believed to be sandy or silty clays formed by high sediment influx of flood flows or possibly density currents.

The thin-bedded nature, fine-grained character, and low resistivity of the stratigraphic marker beds in the lake margin facies are not water supply targets and no water supply wells are known to be completed above the E-Clay in this area.

#### Lake Bed Facies

At the west end of Cross Section X-X' (see **Figure 3**), the Lake Bed facies is characterized by thick, very low resistivity beds of clay and silty clays. Short normal resistivity values of these beds are generally less than 5 ohms. Thin, stratigraphic markers occur with slightly higher resistivity, but are generally less than 2 to 4 ohms greater than the adjacent clay beds and may be difficult to discern on logs using scales typical of water well surveys (e.g., 0 to 50 ohms or 0 to 100 ohms). A typical log for this facies is from Well 27A shown on Cross Section X-X' (see **Figure 3** and attached **Logs**).

The depositional environment for the Lake Bed facies is the deeper lake waters where fine-grained, silt and clay sized sediments settled. The thin, slightly higher resistivity beds represent periods of high sediment inflow and/or turbid density flows into the lake. West of the Cross Section X-X' for 4 miles, geophysical surveys from four recent boreholes included a natural gamma ray log (see X''-X on **Figure 3**). Five distinct gamma ray spikes, or cluster of spikes, were found to correlate between these boreholes. Two of these occurred above and below the E-Clay. The uppermost three gamma ray features appear to correlate to the thin resistivity zones on the westernmost borehole on Cross Section X-X' and may represent volcanic ash that fell into the lake, or was carried into the lake by streams. The spikes may provide a means to correlate the thick lake clay beds where other stratigraphic markers are not discernable; however, most geophysical logs do not include the curve.

The thin, very low resistivity stratigraphic markers in the lake bed facies are not water supply targets and no water supply wells are known to be completed above the E-Clay in this area.

#### 4.4 Extent of 'V' Sequence Facies

From the detailed examination and stratigraphic correlations, including those presented on representative Cross Section X-X', and development of a depositional facies model, the areal extent of the 'V' Sequence facies were mapped in the northern and eastern portions of the Tulare Lake Bed. These areas are the North and East subareas in the KDSA (2014) study. The resistivity values and bedding characteristics (thickness, number, and nature) on the cross-section wells were used to determine facies trends and then evaluated more broadly with geophysical logs from other wells, including other water wells and oil and gas test holes.

The depositional facies of the 'V' Sequence in the Tulare Lake Bed area are shown on **Figure 4**. The delineated facies form an arcuate (curved or bowed) pattern around the north to northeast lake bed region. Available geophysical log control in the west and south areas is more limited because of a lack of wells. The Sandflat facies boundary indicates the interpreted extent of sand beds in the 'V' Sequence with the potential to be used as MUN and AGR supply sources. In the northernmost area it appears that only a lower 'V' sequence sandflat beds occur below a depth of 250 feet overlain by lake-margin to lake-bed facies clay beds. Upper 'V' Sequence sandflat beds appear to occur only to the east as indicated on **Figure 4**.

#### 4.5 Above 'V' Sequence

As shown on Cross Section X-X' on **Figure 3**, overlying the 'V' Sequence is the interpreted A-Clay unit of Croft and Gordon (1968) and Croft (1972). This unit is the vertical delisting boundary discussed in KDSA (2014). At the surface, the Tulare Clay basin soil unit is encountered throughout the Lake Bed area, also as discussed by KDSA (2014).

#### 4.6 Other Lake Bed Areas

The 'V' Sequence sands at the margins of the KDSA (2014) North and East subareas (see **Figure 1b**) have characteristics related to the interpreted depositional setting. Based on the facies type, horizontal limits of sand beds that represent feasible water supply targets can be delineated. The well control in these areas is greatest because they occur where coarse-grained sediments reached the lake bed margins and are of sufficient thickness and character to serve MUN and AGR beneficial uses.

Other areas, corresponding to the KDSA (2014) South and West subareas (see **Figure 1b**), have notably sparser well control, but also no developed water supply sources above the E-Clay. Available well control suggests that these areas are predominantly thick clay with low resistivity beds and markers of slightly higher resistivity similar to the Lake Bed facies. For example, short normal resistivity values for logs from Well 30R and 15K in the South Subarea, scaled at 0 to 20 and 0 to 10 ohms, respectively, range from 2 to 3 ohms up to 7 ohms. In the West Subarea, in the vicinity of Kettleman City, geophysical evidence suggests the possibility of sandflat to lake margin facies sourced from the Coast Range. Though control is very limited, a tentative delineation of 'V' Sequence sands, or equivalent, is made in the KDSA (2014) West Subarea, but these are poorly developed and a realistic boundary would be inside the 'V' Sands West demarcation shown on **Figure 4**. East of the KDSA (2014) South Subarea, well control outside the delisting study area shows evidence of possible alluvial plain to sandflat facies sourced from the east, south, and/or southeast.

## 5. Findings Related to Horizontal and Vertical Delisting Boundaries

Horizontal and vertical boundaries are discussed below in relation to the stratigraphic model described in this technical memorandum.

### 5.1 Horizontal Boundaries

The stratigraphic model presented in the current evaluation delineates two distinct settings with respect to delisting of the Tulare Lake Bed area: 1) a fringe area in the north and northeast corresponding to the KDSA (2014) North and East subareas where sand beds below the A-Clay represent potential sources of MUN and AGR beneficial uses and 2) the rest of the lake bed area dominated by thick, low resistivity clay beds with no MUN or AGR beneficial uses. The sand beds in the north and northeast fringe area indicate a progression of facies transitioning from thick, numerous sand beds outside the Lake Bed to thick clay with low resistivity beds in the center.

Two horizontal boundaries are presented on **Figure 5** that delineate the areas cited above and reflect the combined findings from KDSA (2014) and the current evaluation. First, the KDSA (2014) recommended horizontal boundary encompasses the majority of the Tulare Lake Bed area and considers known MUN beneficial uses near the City of Corcoran and the communities of Stratford, Alpaugh, and Kettleman City. The stratigraphic model in the current evaluation provides a secondary boundary that extends further into the Lake Bed from the north and east to account for the occurrence of sand beds representing potential water supply sources subject to the SDWP; these sand beds are also identified in KDSA (2014).

No changes to the outer recommended horizontal boundaries in the KDSA (2014) report are proposed in the current evaluation. A secondary boundary interior to the lake bed in the north and east is presented on **Figure 5**. This boundary separates two different vertical delisting areas based on the stratigraphic model as discussed in the next section. The two areas are distinguished on **Figure 5** with the hatched area representing the extent of 'V' Sands that inter-finger into the Lake Bed fringes.

### 5.2 Vertical Boundaries

**Figure 5** presents the extent of stratigraphic facies where sands may be encountered that potentially support MUN/AGR uses below the A-Clay vertical delisting boundary recommended in KDSA (2014). In this fringe area, 'V' Sequence sands inter-finger within the lake bed clays and are overlain by the A-Clay.

In the area between the KDSA (2014) horizontal boundary and the secondary, stratigraphic demarcation in this study, it is recommended that the interpreted top of A-Clay be the vertical boundary. This is where first-encountered water above that boundary exceeds MUN and AGR beneficial use criteria as determined in KDSA (2014). As part of the current investigation, groundwater electrical conductivity was estimated for 'V' Sands using the Spontaneous Potential (SP) curve from the recent well logs. Calculations from the SP deflections indicated that these interbedded sands below the interpreted A-Clay in the fringe area have specific conductance values from just under 3,000  $\mu\text{S}/\text{cm}$  to greater than 5,000  $\mu\text{S}/\text{cm}$ . While these values may explain

the lack of water supply wells completed between the A-Clay and E-Clay in this area, some groundwater in these units may not satisfy criteria for MUN delisting (i.e., 5,000  $\mu\text{S}/\text{cm}$ ).

In areas outside the north and northeast fringe where thick lacustrine clay units of the Lake Bed facies are predominant and no known wells support MUN or AGR beneficial uses, the vertical boundary is recommended at the top of the E-Clay. **Figure 6** shows contours of equal depth below ground surface to the top of the E-Clay. Well control and the E-Clay depths are shown on the attached **Plate**. Other than the northern and eastern fringe areas where numerous water well logs were available, much of the contour map for the E-Clay boundary was constructed using oil and gas well logs obtained from the California Division of Oil, Gas and Geothermal Resources website. Both resistivity and gamma ray (when available) curves were used to determine the E-Clay depth.

**Figure 7** presents vertical delisting boundaries throughout the lake bed with top of A-Clay as the vertical boundary in the north and east area (see hatching) and top of E-Clay throughout the rest of the lake bed.

#### Attachments

##### **Figures 1-7**

**Plate:** Well Control and Contours of Equal Depth to Top of E-Clay

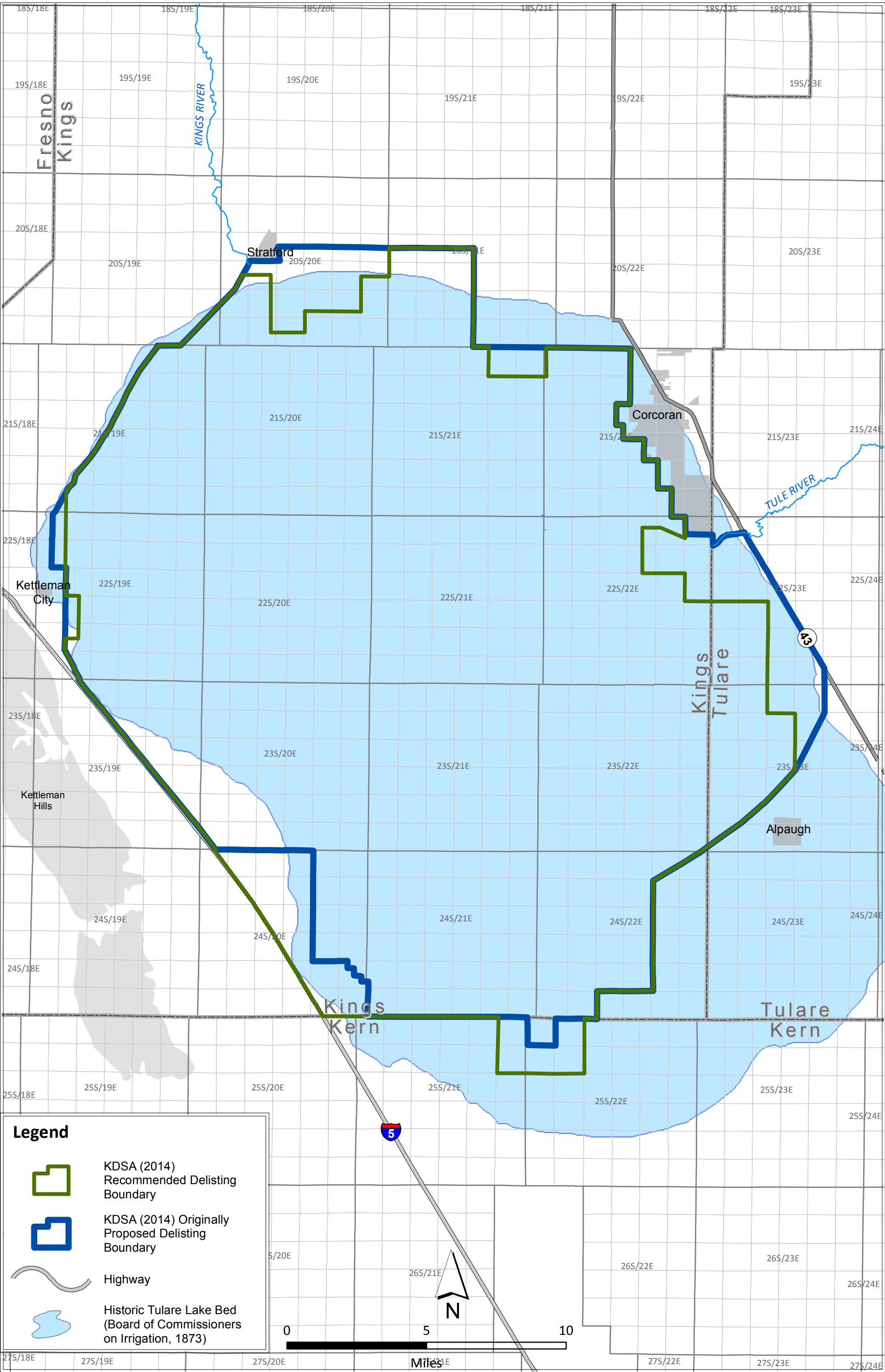
**Logs:** Recent Wells with Geophysical Logs; Oil and Gas Wells (CD)

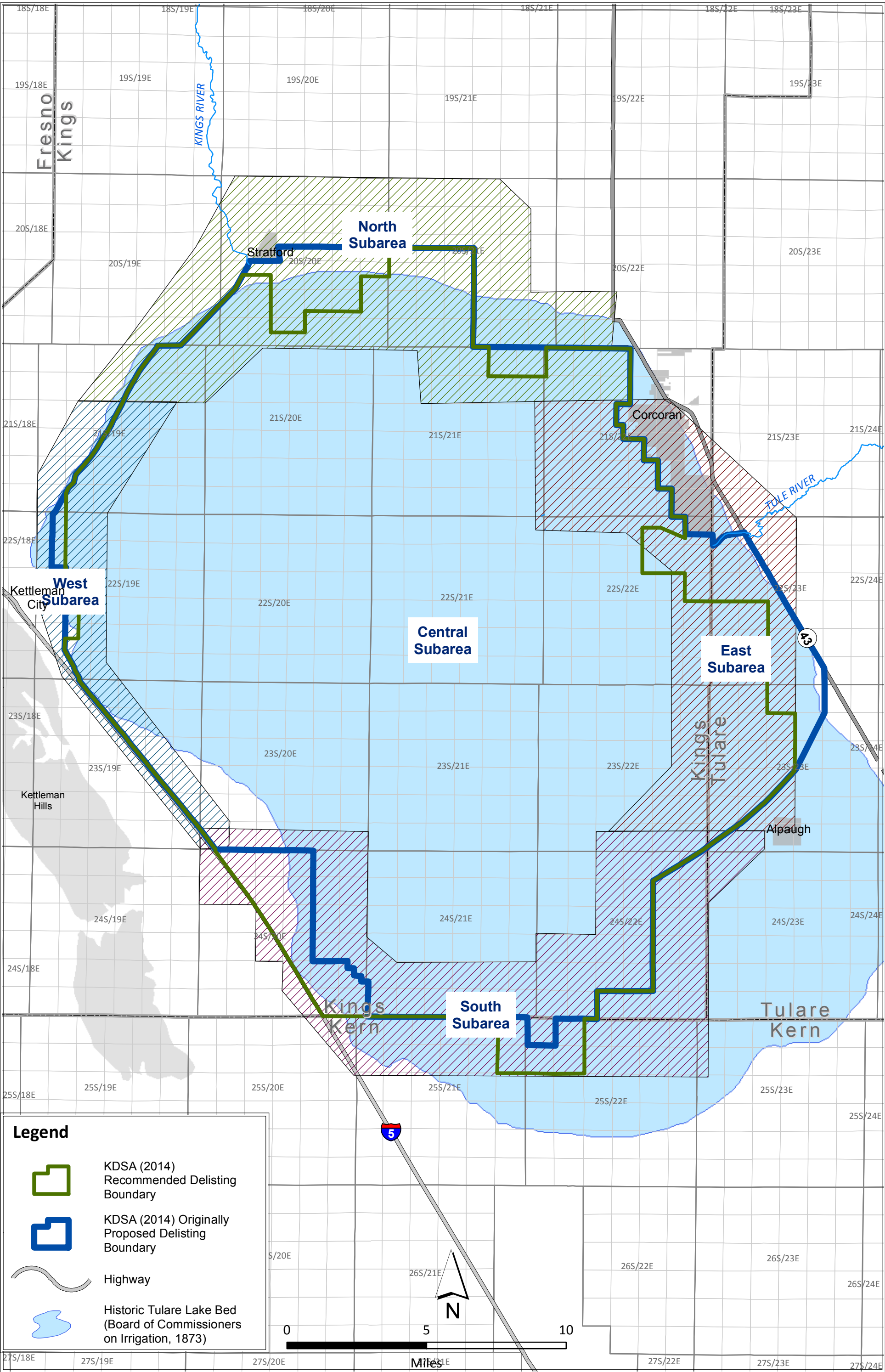
## References

- \_\_\_\_\_. 1873. *Map of San Joaquin, Sacramento and Tulare Valleys, State of California*. Prepared under direction of the Board of Commissioners on Irrigation, appointed under the Act of Congress approved March 3rd 1873, showing the country that may be irrigated and a provisional system of irrigation. Compiled from the Maps of the Geological Survey of California and from Special Survey and Examinations.
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- Page, R.W. 1986. *Geology of the Fresh Ground-Water Basin of the Central Valley, California, with Texture Maps and Sections*. USGS Professional Paper: 1401-C.
- Wood, P.R. and Davis, G.H. 1959. *Ground-Water Conditions in the Avenal-McKittrick Area, Kings and Kern Counties, California*. USGS Water Supply Paper: 1457.

# Figures

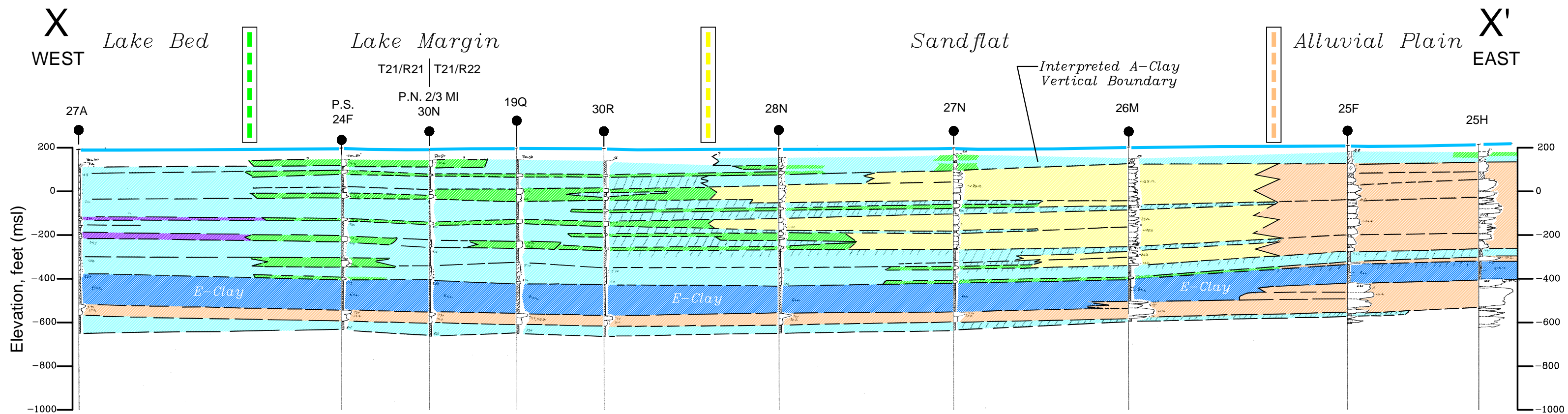












## LEGEND

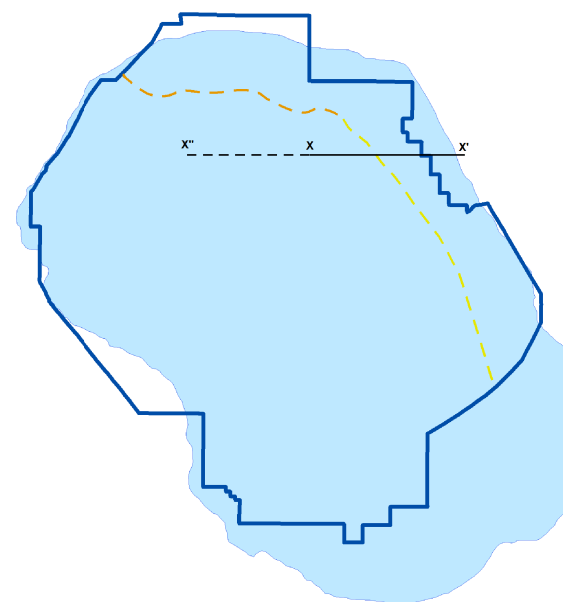
— *Tulare Clay Basin Soils (KDSA, 2014)*

*"V" Sequence*

- Alluvial Plain Thick Sand Beds - High Resistivity*
- Sandflat Thick to Thin Sand Beds - Medium Resistivity*
- Lake Margin Sandy, Silty Clays - Low Resistivity*
- Lake Bed Stratigraphic Markers - Low Resistivity*
- Lake Clay Beds - Low Resistivity*

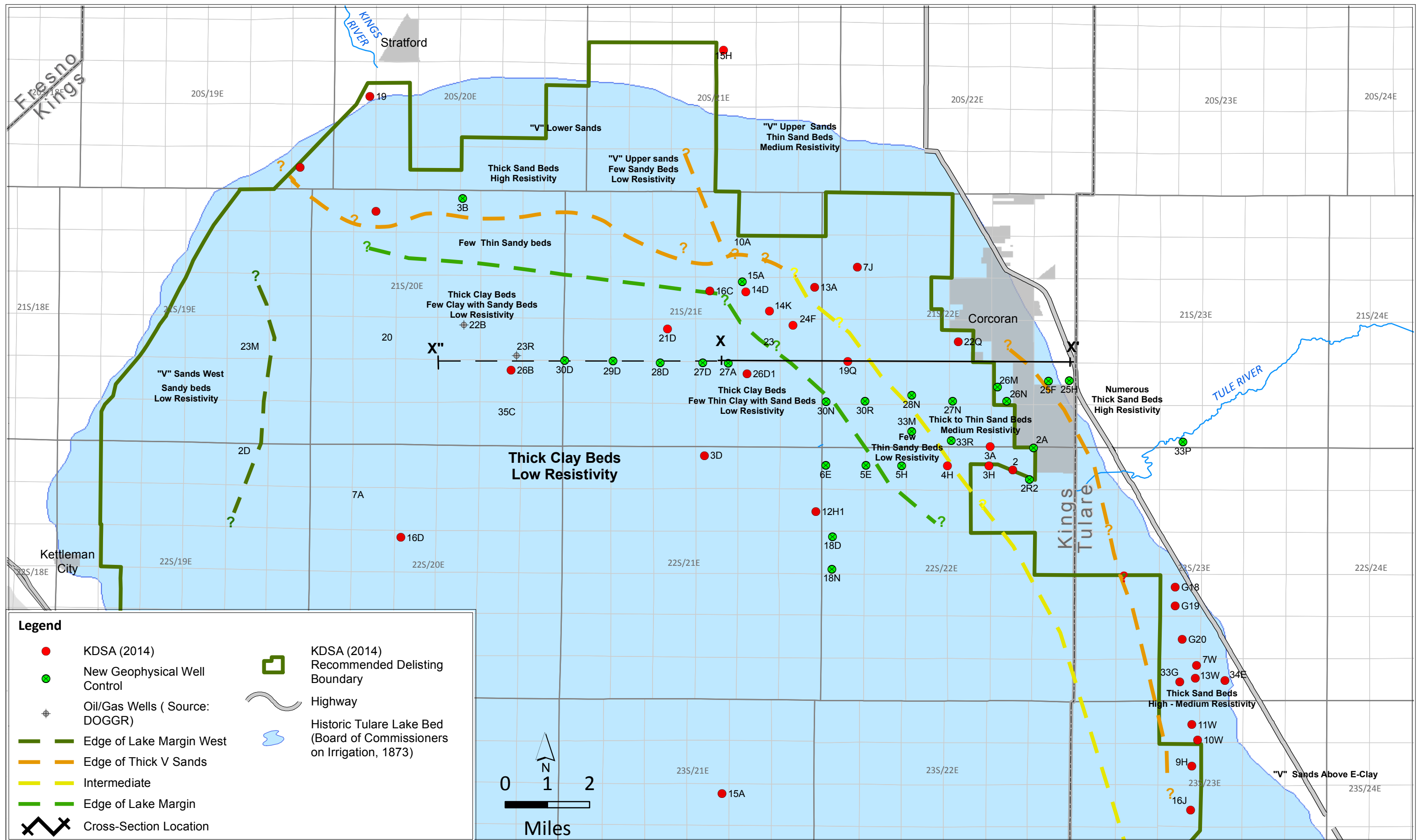
*"E-Clay"*

- Lake Beds*



GEOLOGIC CROSS SECTION X-X' LOCATION

Scale in Feet  
0' 1320' 2640'  
1" = 1/4 Mile







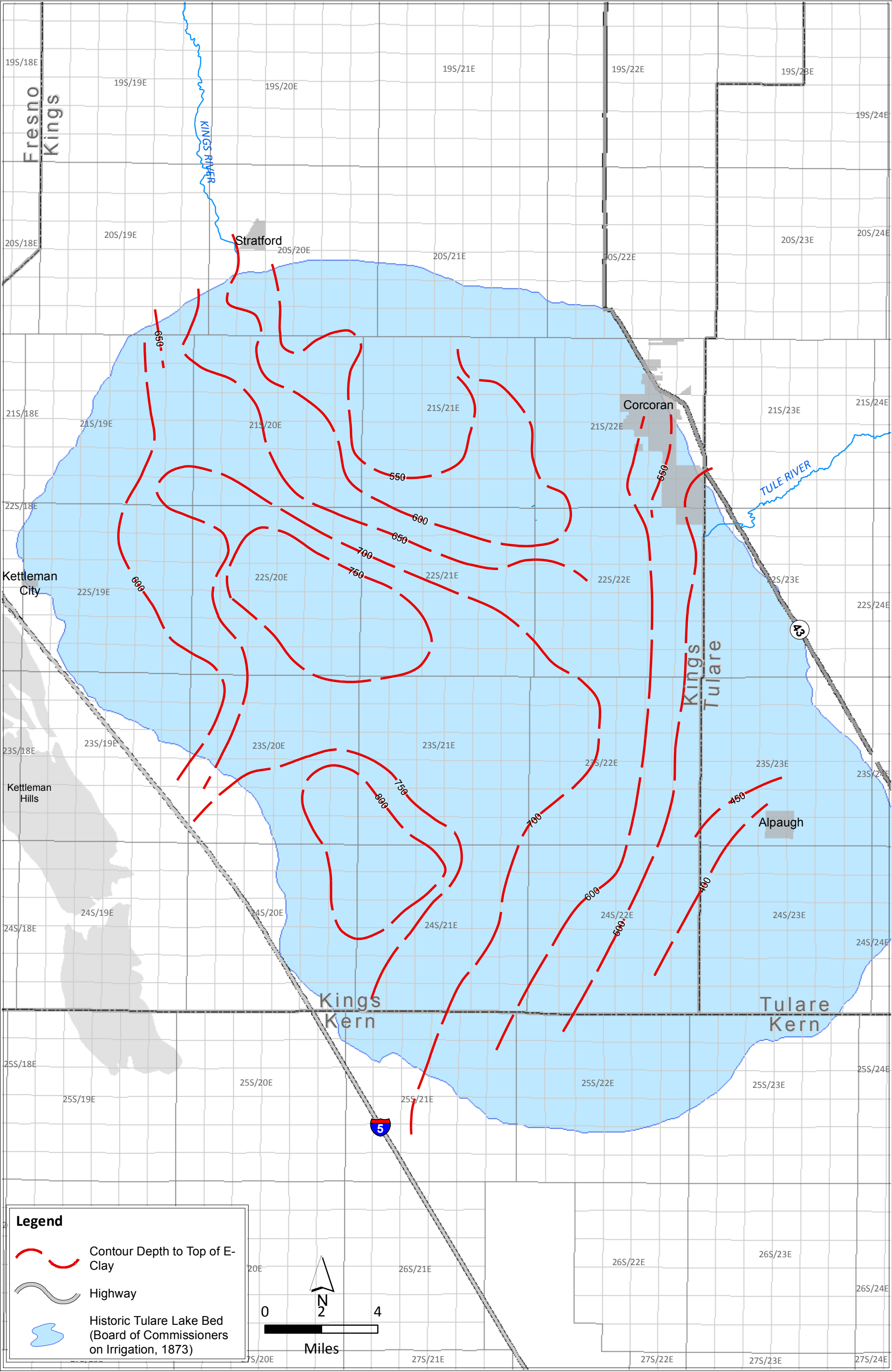
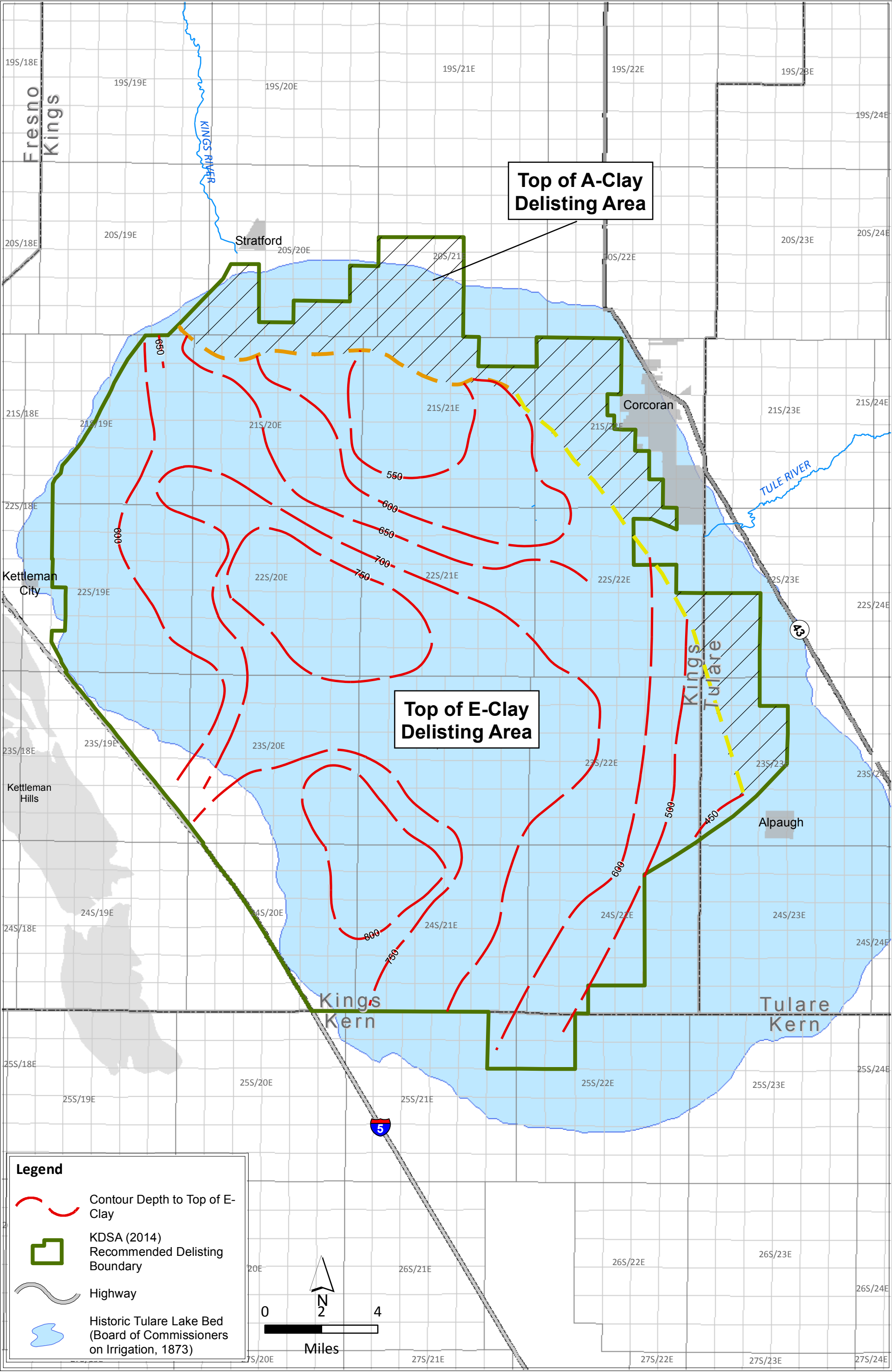


Figure 6  
Contour of Depth to Top of E-Clay  
Tulare Lake Bed





# Plate <sup>(1)</sup> <sup>(2)</sup>

## **Well Control for E-Clay Contour Map**

(1) Logs from KDSA (2014) not included.

(2) Oil and gas logs contained on CD.

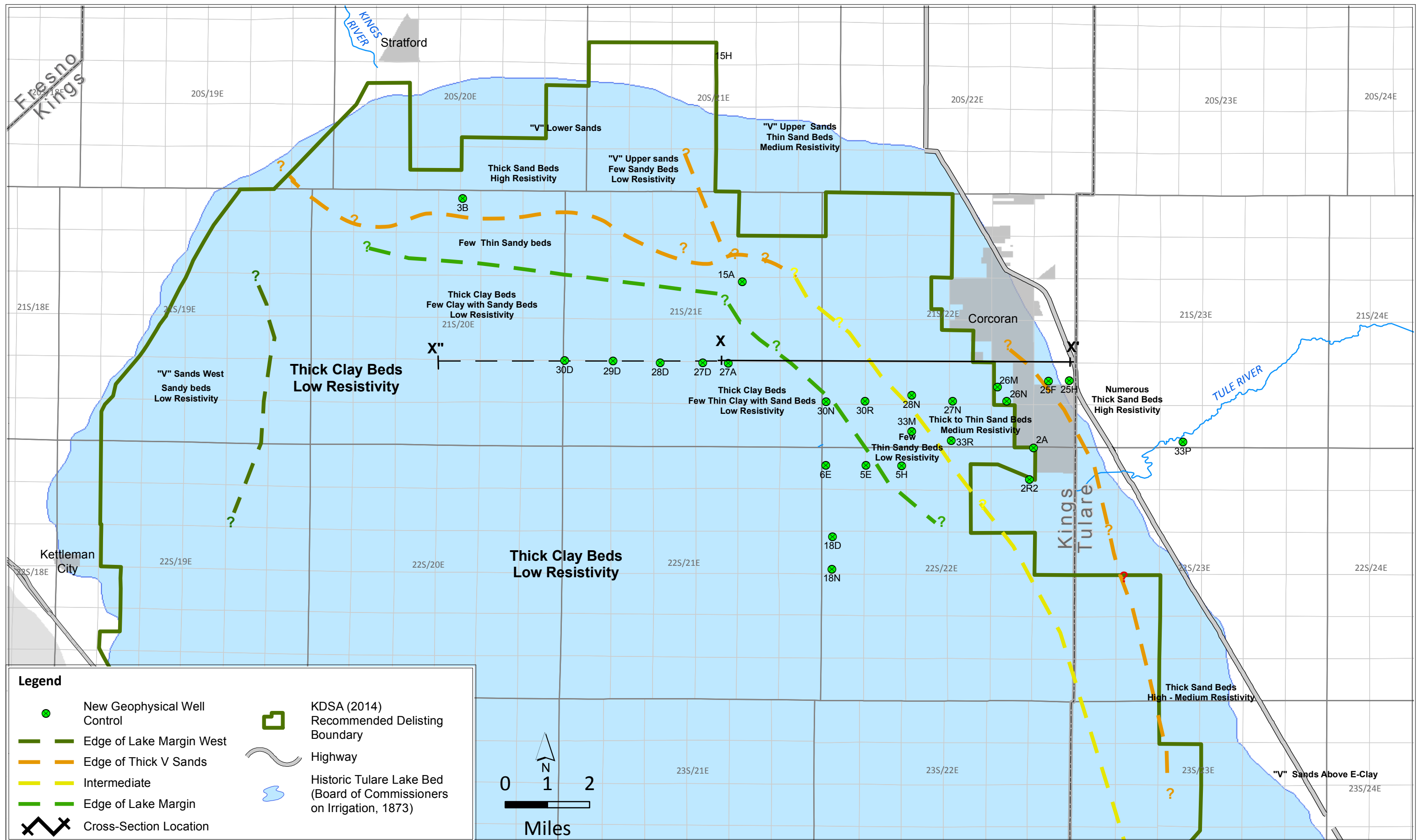


# Logs <sup>(1)</sup>

Recent E-Logs  
Additional Oil and Gas Logs <sup>(2)</sup>

(1) Logs from KDSA (2014) not included.

(2) Oil and gas logs contained on CD.





215/20E 3B

**SCHLUMBERGER**  
**INDUCTION-ELECTRICAL LOG**  
SCHLUMBERGER WELL SURVEYING CORPORATION  
Houston, Texas

COUNTY KINGS  
FIELD or LOCATION TULARE LAKE  
WELL 2-11-6400-067659-1

COMPANY                     

WELL                     

FIELD TULARE LAKE

COUNTY KINGS STATE CALIFORNIA

LOCATION                     

Sec. 3 Twp. 21S Rge. 20E

Other Services:                     

Permanent Datum: GL Elev. 185

Log Measured From KB 10 Ft. Above Perm. Datum

Drilling Measured From KB Elev. K.B. 195  
D.F. 185  
G.L. 185

Date	2-7-65	2-7-65	
Run No.	1	2	
Depth-Driller			
Depth-Logger			
Bim. Log Interval			
Top Log Interval	37		
Casing-Driller			
Casing-Logger			
Bit Size	15"	REMARKS	
Type Fluid in Hole	FRESH	FRESH	
Dens. Visc.	72 36	73 35	
pH	5.8 ml	6.0 ml	
Source of Sample	PIT	CIRCULATED	
R <sub>m</sub> @ Meas. Temp.	7.3 @ 63°F	6.3 @ 75°F	
R <sub>mf</sub> @ Meas. Temp.			
R <sub>mc</sub> @ Meas. Temp.			
Source: R <sub>mf</sub>			
R <sub>m</sub> @ BHT	4.8 @ 99°F	4.8 @ 99°F	
R <sub>mf</sub> @ BHT			
R <sub>mc</sub> @ BHT			
Time Since Circ.	1 1/2 HR	2 HR	
Max. Rec. Temp.	99 °F	99 °F	
Equip. Location	37161 CL	37161 CL	
Recorded By	MONSON	MONSON	
Witnessed By	WALDREN	WALDREN	

FOLD HERE

REMARKS

Changes in Mud Type or Additional Samples		Scale Changes	
Date	Sample No.	Type Log	Depth
Depth-Driller			
Type Fluid in Hole			
Dens.	Visc.		
ph	Fluid Loss		
Source of Sample			
R <sub>m</sub> @ Meas. Temp.	@ °F	Run No.	Tool Type
R <sub>mf</sub> @ Meas. Temp.	@ °F	1	6FF40
R <sub>mc</sub> @ Meas. Temp.	@ °F	2	6FF40
Source: R <sub>mf</sub>			Tool Position
R <sub>m</sub> @ BHT	@ °F		STAND OFF
R <sub>mf</sub> @ BHT	@ °F		STAND OFF
R <sub>mc</sub> @ BHT	@ °F		Other

Run No.: 1 & 2 BIT SIZE: RUN #2

C.D.: USED

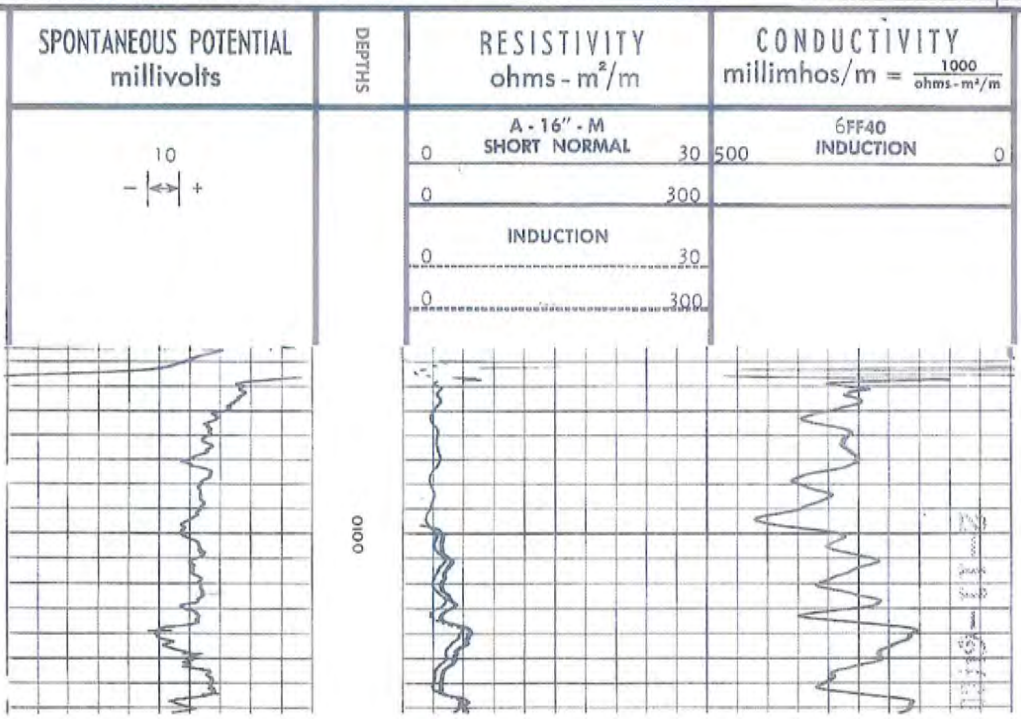
S.O.: 1 1/2"

Equip. Used: CART. No.: F 99

PANEL No.: F 264

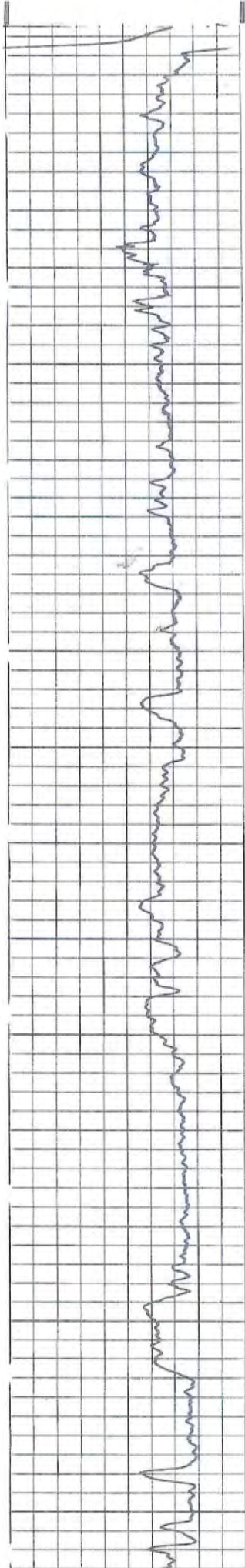
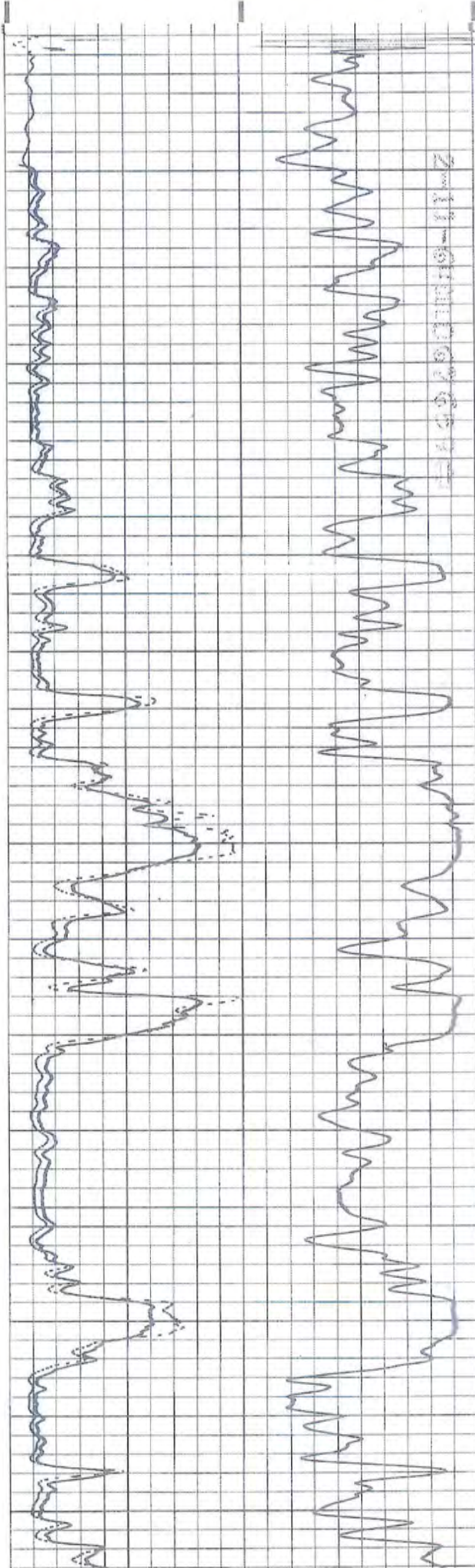
SONDE No.: M 361

S.B.R.: 2





3B





215/22E 25H

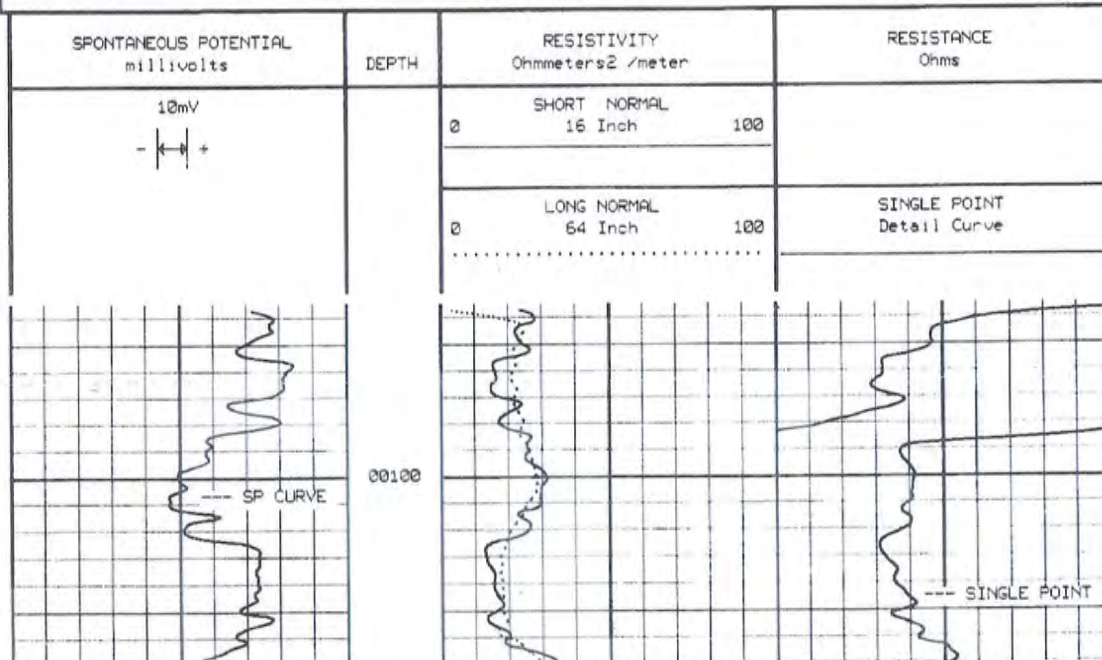


ELECTRIC LOG

FILING NO.		COMPANY		WELL		FIELD		STATE		LOCATION: PLYMOUTH & 4TH STREET		OTHER SERV:	
21068		SEC 25		TWP 21S		RGE 22E		CORCORAN		CALIFORNIA		KINGS	
JOB NO.		PERMANENT DATUM: GROUND LEVEL		Elev:		K.B.		D.F.		G.L.		NONE	
Log Measured From G.L. 0 ft Above Perm Datum		Log Measured From G.L.		D.F.		G.L.							
Date		10-25-1952		Run No.		ONE		TWO		THREE			
Depth - Driller		1		Depth - Logger		1		37		30		at 40	
Btm. Log Inter.		37		Top Log Inter.		30		at 40		at			
Casing-Driller		30		Casing-Logger		30		at N/A		17-1/2			
Bit Size		BENTONITE		Type Fluid In Hole		N/A		N/A		N/A		ml	
Dens. Visc.		N/A		PH		N/A		N/A		N/A		ml	
Source of Sample		MUD PIT		Rm at Meas. Temp		13.8		at 75 F		Rmf at Meas. Temp		14.7	
Rmc at Meas. Temp		N/A		at 75 F		Rmc at Meas. Temp		N/A		at 75 F			
Source: Rmf Rmc		N/A		Rm at BHT		N/A		at F		Rmf at BHT		N/A	
Time Since Circ.		3 HRS		Max. Rec. Temp.		N/A		F		Equip Location		L-10 BFLD	
Recorded By		Z. BOBINSKI		Witnessed By		B. GREGG							

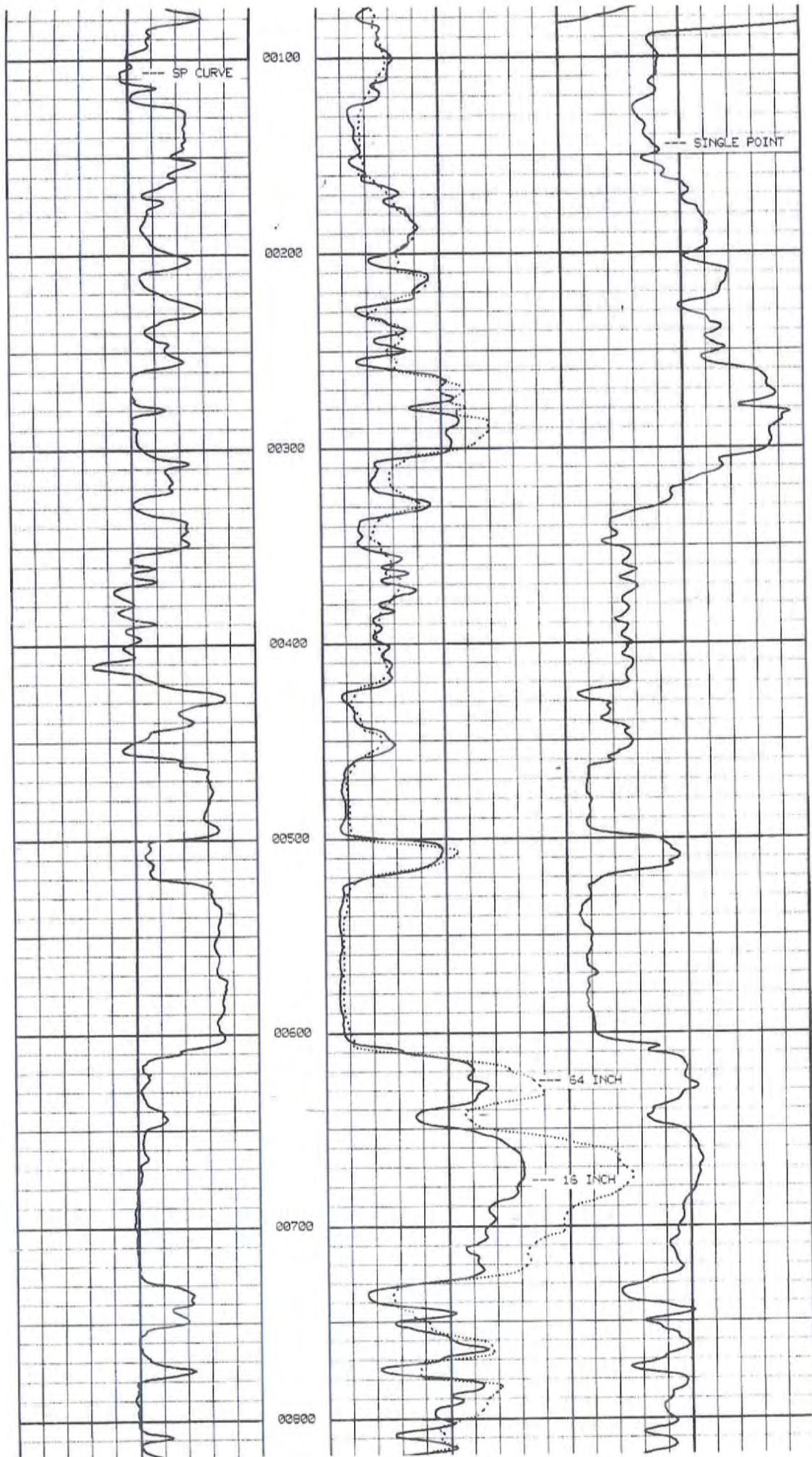
Fold Here This Heading and Log Conform To API RP 31

REMARKS										
Changes in Mud Type or Additional Samples					Scale Changes					
Date	Sample No.	Type Log	Depth	Scale Up Hole	Scale Down Hole					
Depth-Driller										
Type Fluid in Hole										
Dens.	Visc.	ml		mi						
ph	Fluid Loss									
Source of Sample					Equipment Data					
Rm	at Meas. Temp.	at	F	at	F	Run No.	Tool Type	Pad Type	Tool Pos	Other
Rmf	at Meas. Temp.	at	F	at	F	ONE	ELECTRIC		FREE	
Rmc	at Meas. Temp.	at	F	at	F					
Source: Rmf Rmc										
Rm	at BHT	at	F	at	F					
Rmf	at BHT	at	F	at	F					
Rmc	at BHT	at	F	at	F					





25H



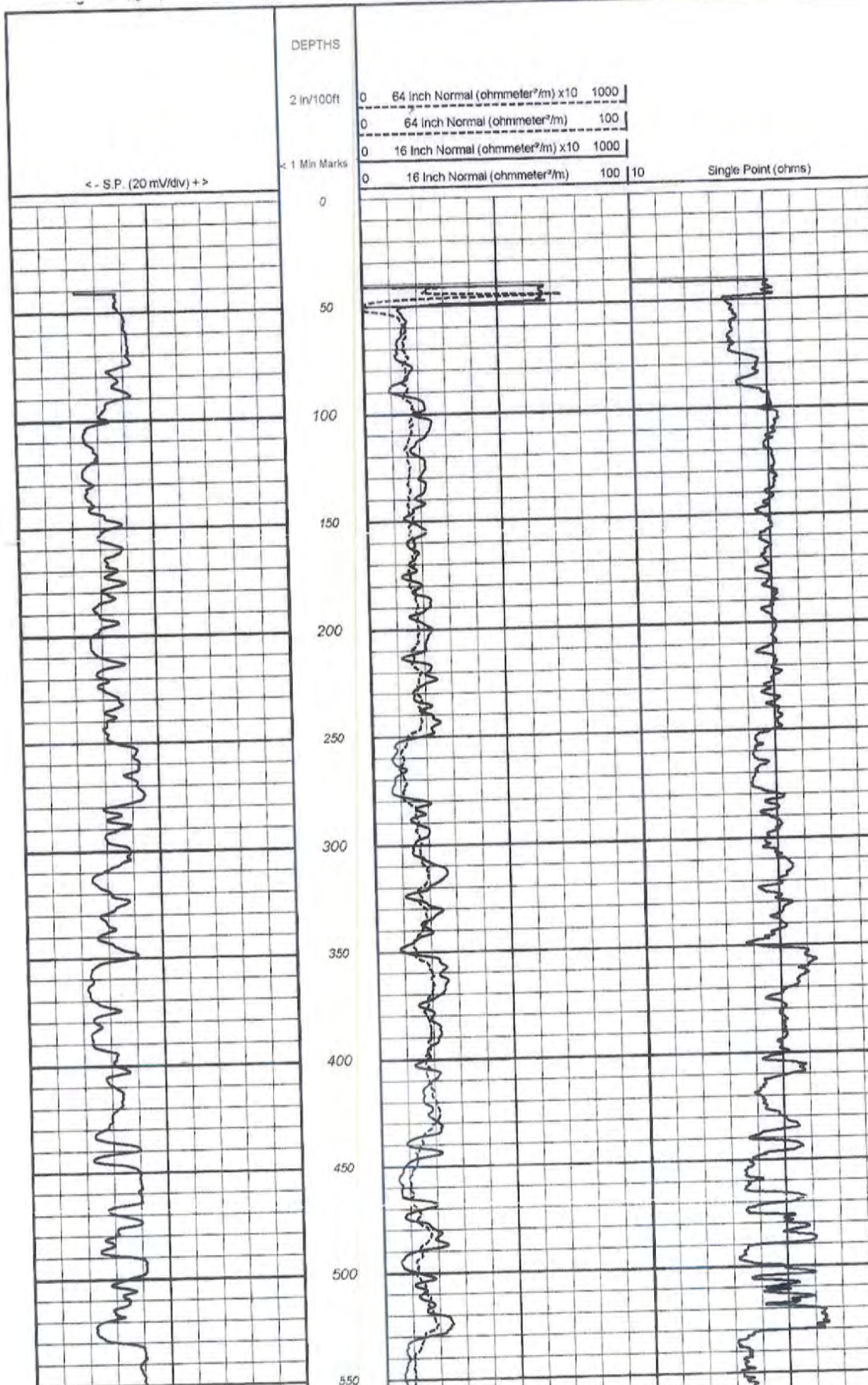


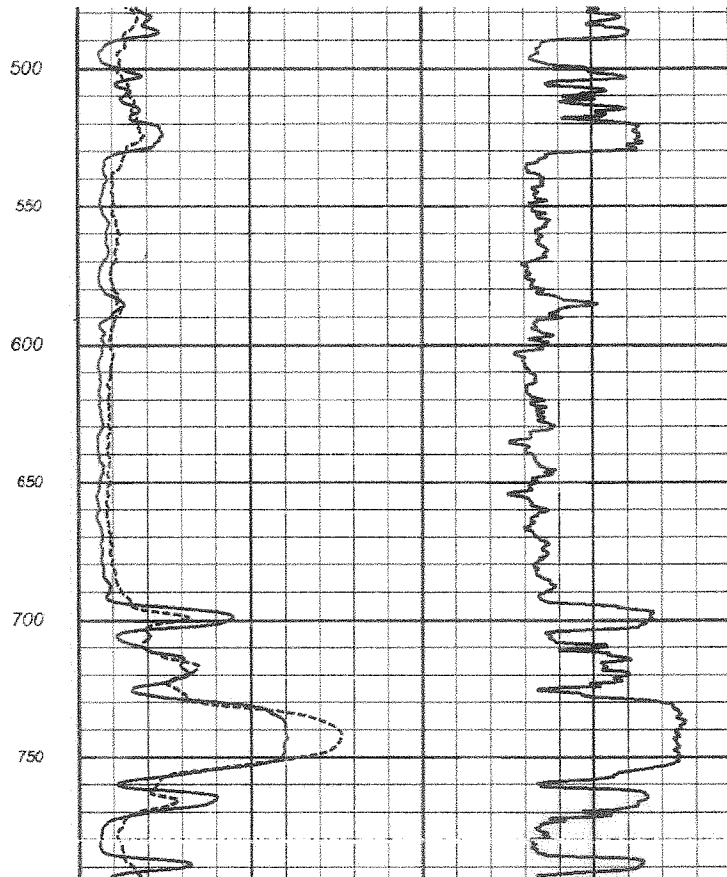
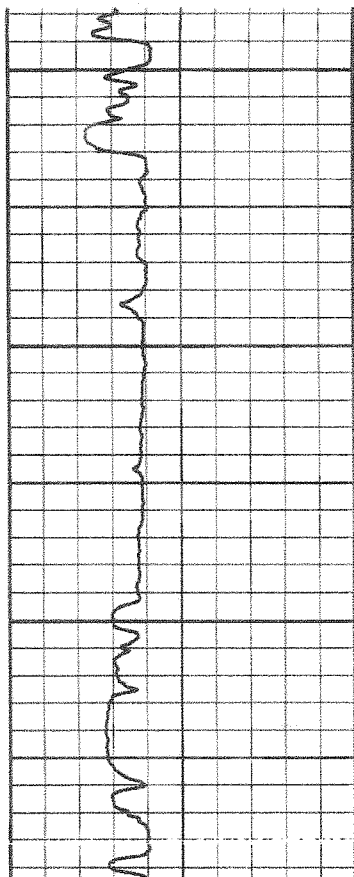
21S/22E

26N

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California Contractor's License No. 722373**ELECTRIC LOG**

FILING NO.	COMPANY			
	WELL			
	FIELD	Corcoran		
	STATE	California	COUNTY	Tulare
JOB NO. 7910	LOCATION:	27905 6th Ave.		
	OTHER SERVICES:	None		
SEC: 23 TWP: 21S RGE: 22E LAT.: 36° 4' 47.3" LONG.: 119° 34' 18.6" MERIDIAN: Mt. Diablo				
Permanent Datum: Ground Level, Elev. _____ Ft. Elev.: K.B. _____ Ft.				
Log Measured From: Ground Level, 0 Ft. Above Perm. Datum D.F. _____ Ft.				
Drilling Measured From: Ground Level G.L. _____ Ft.				
Run	One			
Date	Aug 13 2007			
Depth-Driller		Ft	Ft	Ft
Depth-Logger		Ft	Ft	Ft
Top Logged Interval		Ft	Ft	Ft
Btm. Logged Interval		Ft	Ft	Ft
Casing-Driller	30 In @ 50	Ft	In @	Ft
Casing-Logger	30 In @ 50	Ft	In @	Ft
Bit Size	17.5	In	In	In
Time On Bottom	9:19			
Type Fluid In Hole	Bentonite			
Density	Viscosity			
pH	Fluid Loss	ml	ml	ml
Source of Sample	Pit			
Rm @ Measured Temp.	16.4 @ 75	°F	@	°F
Rmf @ Measured Temp.	16.4 @ 75	°F	@	°F
Rmc @ Measured Temp.	@	°F	@	°F
Source Rmf	Rmc			
Rm @ BHT	@	°F	@	°F
Time Since Circulation	3	Hr	Hr	Hr
Max. Rec. Temp.		°F	°F	°F
Van No.	Location	L-17	Bld	
Recorded By	Craig Corbell			
Witnessed By	Mike Hylton			





26M  
—

**we/enco**

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## ELECTRIC LOG

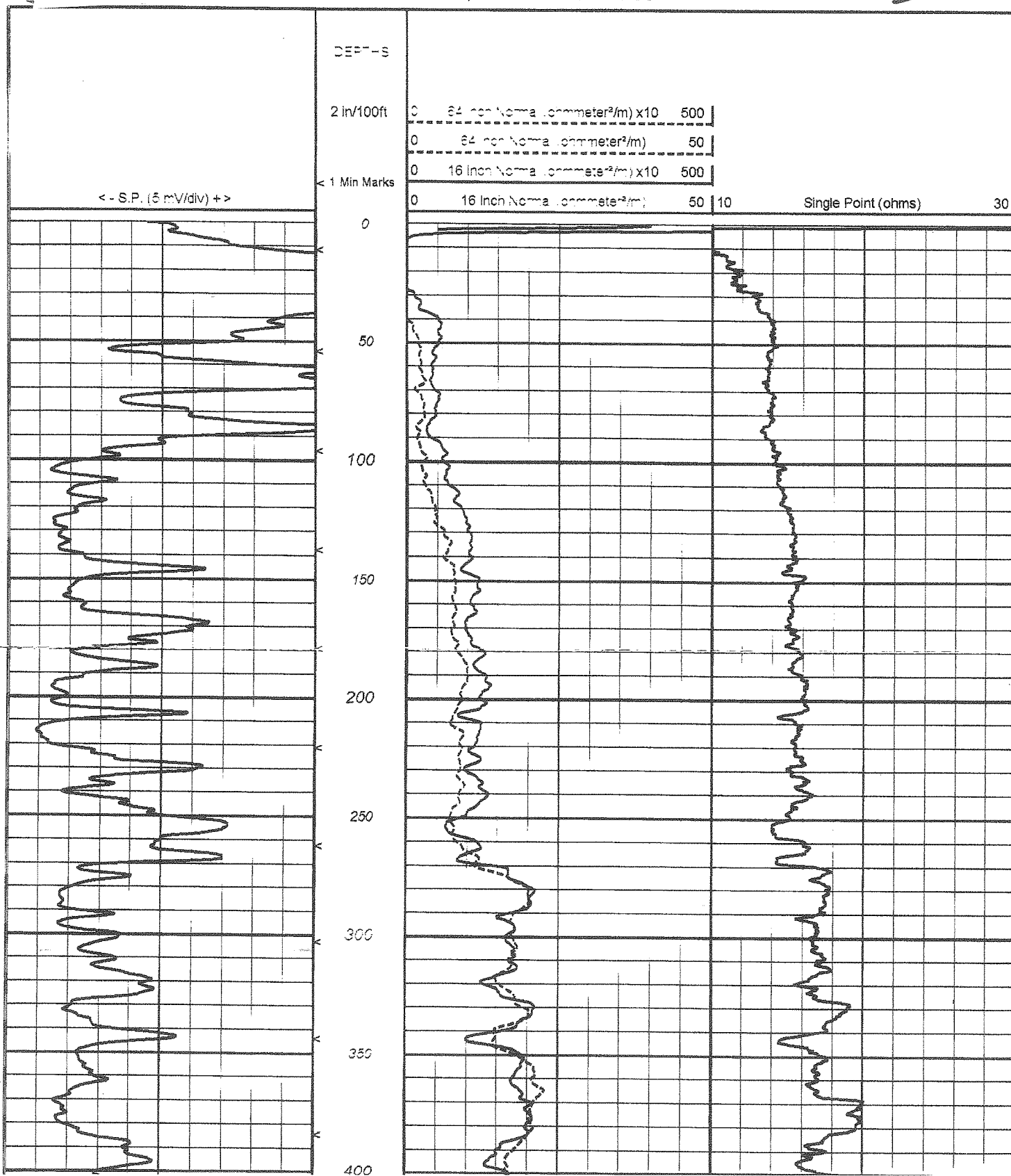
FILING NO.		COMPANY		WELL		FIELD		STATE		LOCATION:		OTHER SERVICES:	
						Corcoran		California		Tulare		None	
JOB NO. 8904		SEC. 31 TWP. 21S. RGE. 27E. LAT.: 36° 03' 4.7" LONG.: 119° 3' 195.1" MERIDIAN: Mt. Diablo Approx. 1/2 Mi. East of the Intersection of 8th Ave and Road 144., South of Corcoran Prison											
Permanent Datum:		Ground Level		Elev.		Ft		Ft		Ft		Ft	
Log Measured From:		Ground Level		0		Ft Above Perm. Datum		D.F.		Ft		Ft	
Drilling Measured From:		Ground Level						G.L.		Ft		Ft	
Run		One											
Date		Mar. 03, 2008											
Depth-Driller				Ft								Ft	
Depth-Logger				Ft								Ft	
Top Logged Interval		0		Ft								Ft	
Btm. Logged Interval				Ft								Ft	
Casing-Driller		32		In @ 30		Ft		In @		In @		Ft	
Casing-Logger				In @ 30		Ft		In @		In @		Ft	
Bit Size		17.5		In				In				In	
Time On Bottom		11:54, Mar 2											
Type Fluid In Hole		Bentonite											
Density													
pH													
Viscosity													
Fluid Loss													
Source of Sample		Pit											
Run @ Measured Temp.		6.6 @ 75		°F		@		@		@		°F	
Run @ Measured Temp.		5.3 @ 75		°F		@		@		@		°F	
Run @ Measured Temp.		@		°F		@		@		@		°F	
Source Run		Meas											
Run @ BHT		@		°F		@		@		@		°F	
Time Since Circulation		5.0		Hr								Hr	
Max. Rec. Temp.				°F								°F	
Van No.		L-23		Bfid									
Recorded By		Craig Corbell											
Witnessed By													



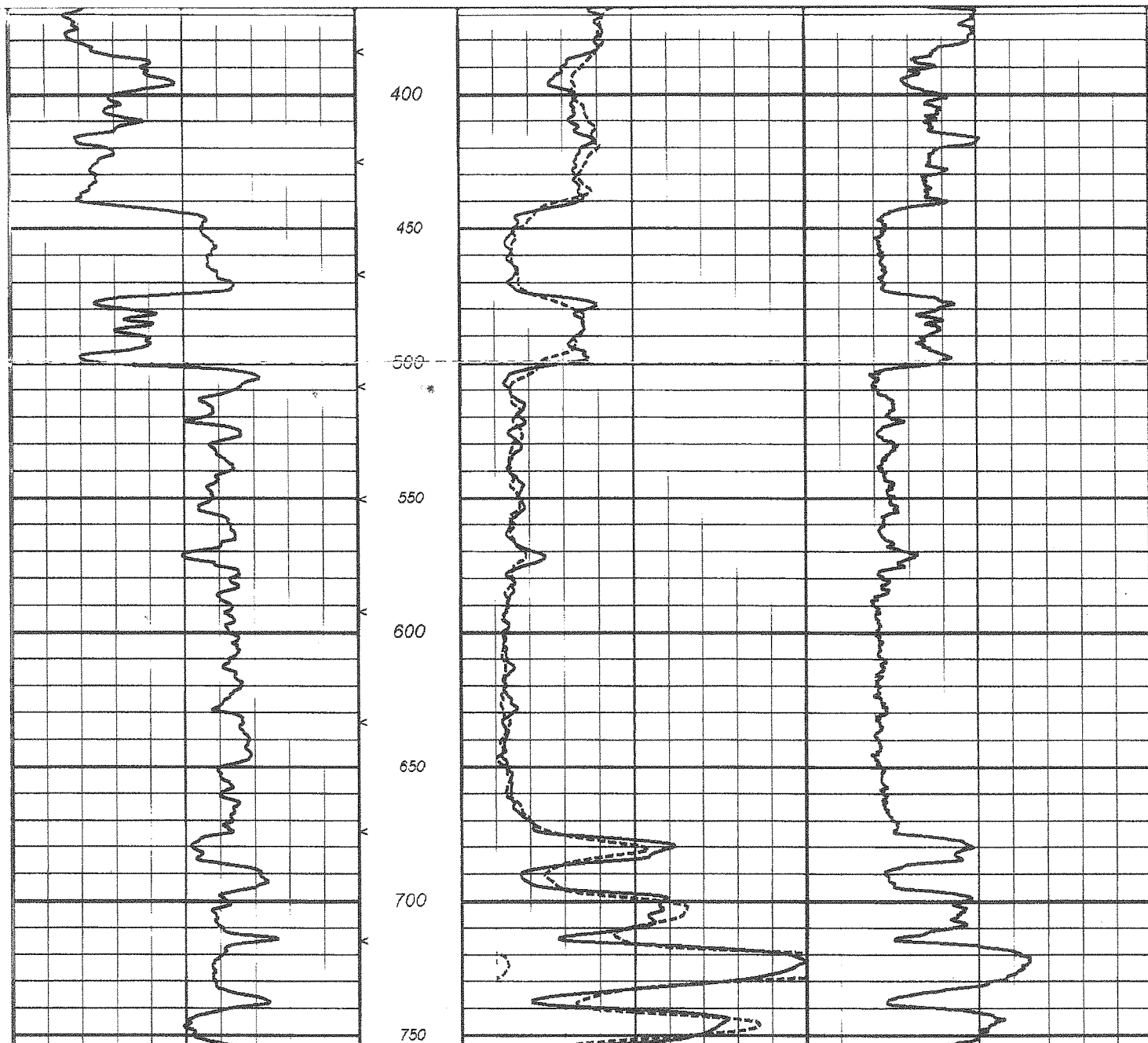
# GEOPHYSICAL WELL LOGS

2A

Mar 3, 2008 C:\.....8904e.LOG



2A



welenco

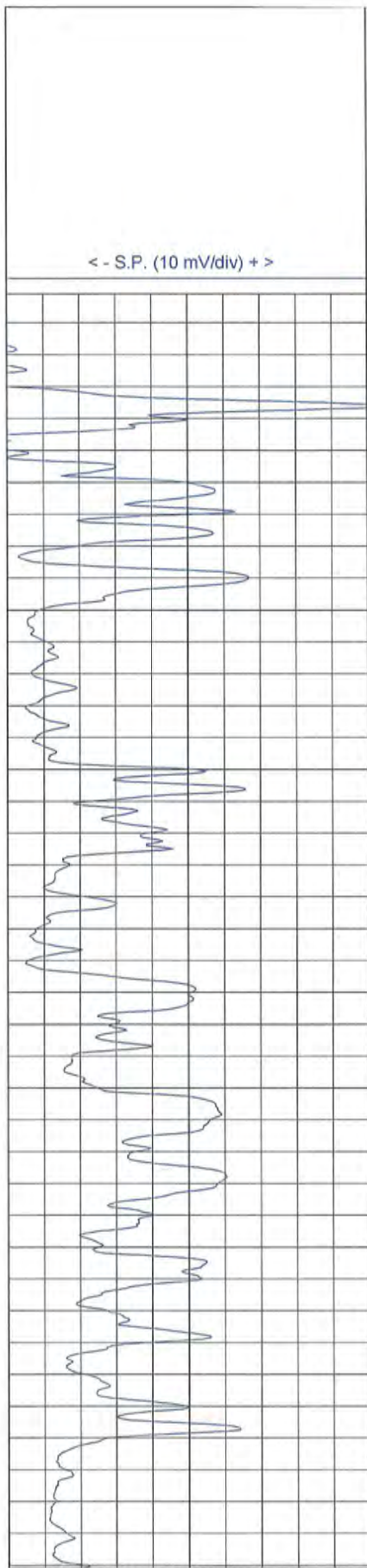
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## ELECTRIC LOG

FILING NO.	COMPANY _____				
JOB NO. 9353	WELL _____ FIELD <u>Corcoran</u> STATE <u>California</u> COUNTY <u>Kings</u> LOCATION: <u>Approx 2 MI South of Quebec on Dirt 5th Ave</u> OTHER SERVICES: <u>None</u>				
SEC: <u>1</u> TWP: <u>22S</u> RGE: <u>22E</u> LAT.: <u>36° 2' 21.4"</u> LONG.: <u>119° 33' 16.8"</u> MERIDIAN.: <u>Mt. Diablo</u>					

Permanent Datum: Ground Level, Elev. \_\_\_\_\_ Ft. Elev.: K.B. \_\_\_\_\_ Ft.  
 Log Measured From: Ground Level, 0 Ft. Above Perm. Datum D.F. \_\_\_\_\_ Ft.  
 Drilling Measured From: Ground Level G.L. \_\_\_\_\_ Ft.

Run	<u>One</u>			
Date	<u>May. 20, 2008</u>			
Depth-Driller	_____ Ft	_____ Ft	_____ Ft	_____ Ft
Depth-Logger	_____ Ft	_____ Ft	_____ Ft	_____ Ft
Top Logged Interval	<u>1</u> Ft	_____ Ft	_____ Ft	_____ Ft
Btm. Logged Interval	_____ Ft	_____ Ft	_____ Ft	_____ Ft
Casing-Driller	<u>32</u> In @ <u>40</u> Ft	_____ In @ _____ Ft	_____ In @ _____ Ft	_____ In @ _____ Ft
Casing-Logger	_____ In @ <u>40</u> Ft	_____ In @ _____ Ft	_____ In @ _____ Ft	_____ In @ _____ Ft
Bit Size	<u>17.5</u> In	_____ In	_____ In	_____ In
Time On Bottom	<u>9:30</u>			
Type Fluid In Hole	<u>Bentonite</u>			
Density	_____	_____	_____	_____
Viscosity	_____	_____	_____	_____
pH	_____	_____	_____	_____
Fluid Loss	_____ ml	_____ ml	_____ ml	_____ ml
Source of Sample	<u>Pit</u>			
Rm @ Measured Temp.	<u>13.2</u> @ <u>75</u> °F	_____ @ _____ °F	_____ @ _____ °F	_____ @ _____ °F
Rmf @ Measured Temp.	<u>10.6</u> @ <u>75</u> °F	_____ @ _____ °F	_____ @ _____ °F	_____ @ _____ °F
Rmc @ Measured Temp.	_____ @ _____ °F	_____ @ _____ °F	_____ @ _____ °F	_____ @ _____ °F
Source Rmf Rmc	_____	_____	_____	_____
Rm @ BHT	_____ @ _____ °F	_____ @ _____ °F	_____ @ _____ °F	_____ @ _____ °F
Time Since Circulation	<u>3</u> Hr	_____ Hr	_____ Hr	_____ Hr
Max. Rec. Temp.	_____ °F	_____ °F	_____ °F	_____ °F
Van No.	<u>L-22</u>	<u>Bfld</u>	_____	_____
Location	_____			
Recorded By	<u>Craig Corbell</u>			
Witnessed By	_____			



Log Page No. 1

DEPTHS

2 in/100ft

ELECTRIC LOG

2R2

0 64 Inch Normal (ohm.m) x20 1000

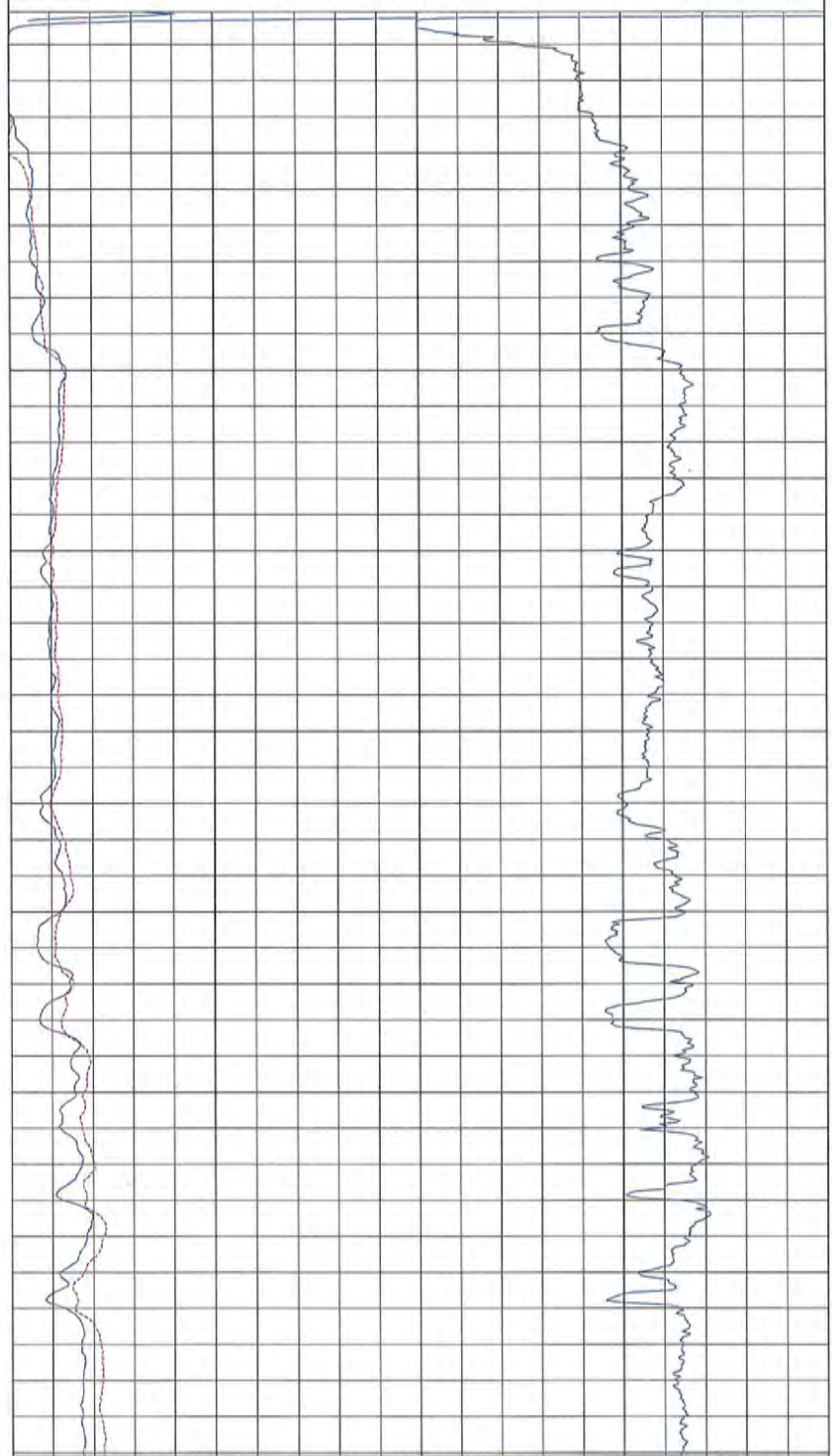
0 64 Inch Normal (ohmmeter<sup>2</sup>/m) 100

0 16 Inch Normal (ohm.m) x20 1000

0 16 Inch Normal (ohmmeter<sup>2</sup>/m) 100

0 Single Point (ohms) 25

1  
50  
100  
150  
200  
250  
300  
350  
400



Page Length: 1 - 401 Feet (400 Feet)

Time: 01:34:28 PM

Date: May 21, 2008



# ELECTRIC LOG

2R2

DEPTHS

2 in/100ft

< - S.P. (10 mV/div) + >

0 64 Inch Normal (ohm.m) x20 1000

0 64 Inch Normal (ohmmeter<sup>2</sup>/m) 100

0 16 Inch Normal (ohm.m) x20 1000

0 16 Inch Normal (ohmmeter<sup>2</sup>/m) 100

Single Point (ohms)

25

450

500

550

600

650

700

750

800

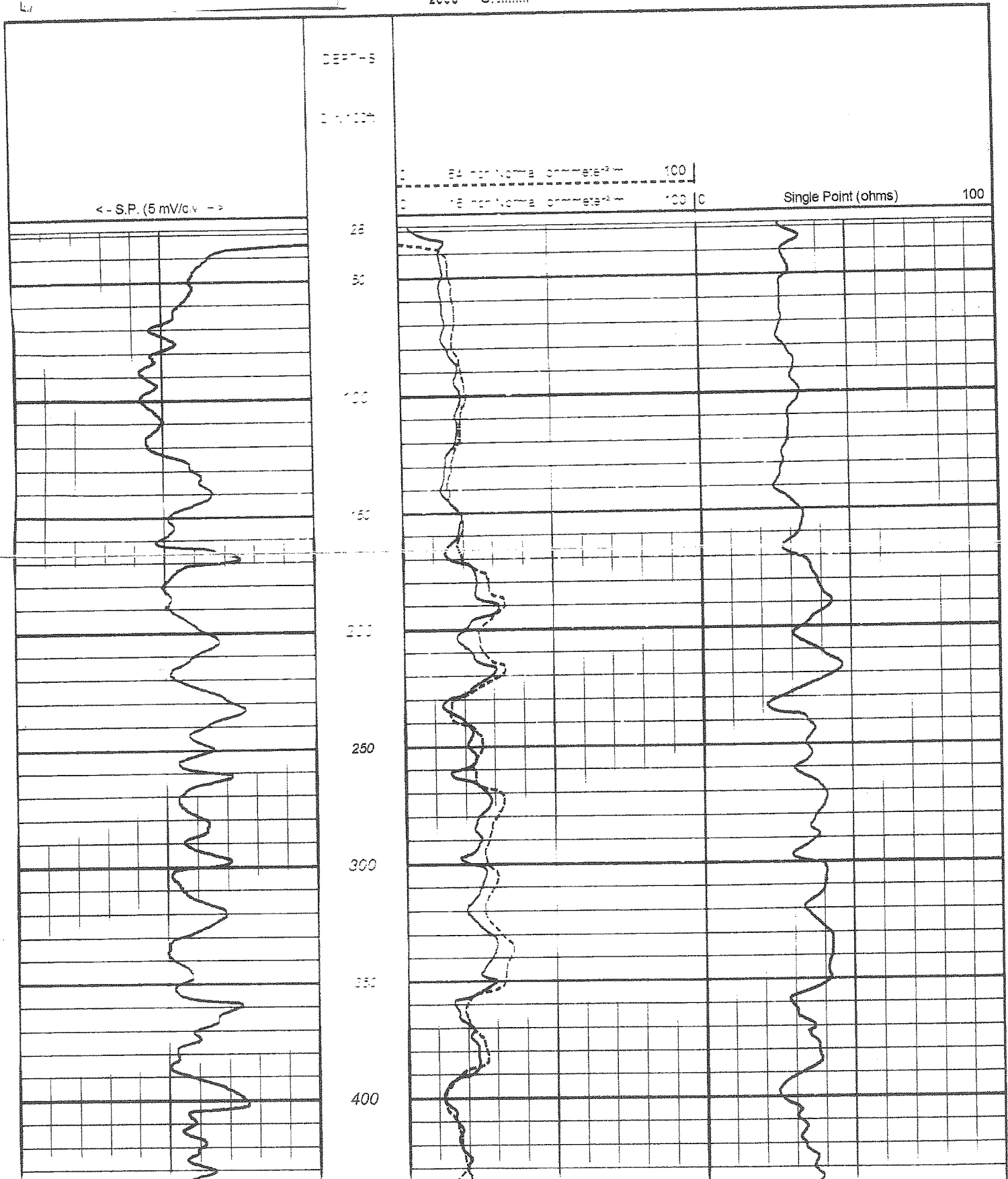
215/22E

25F

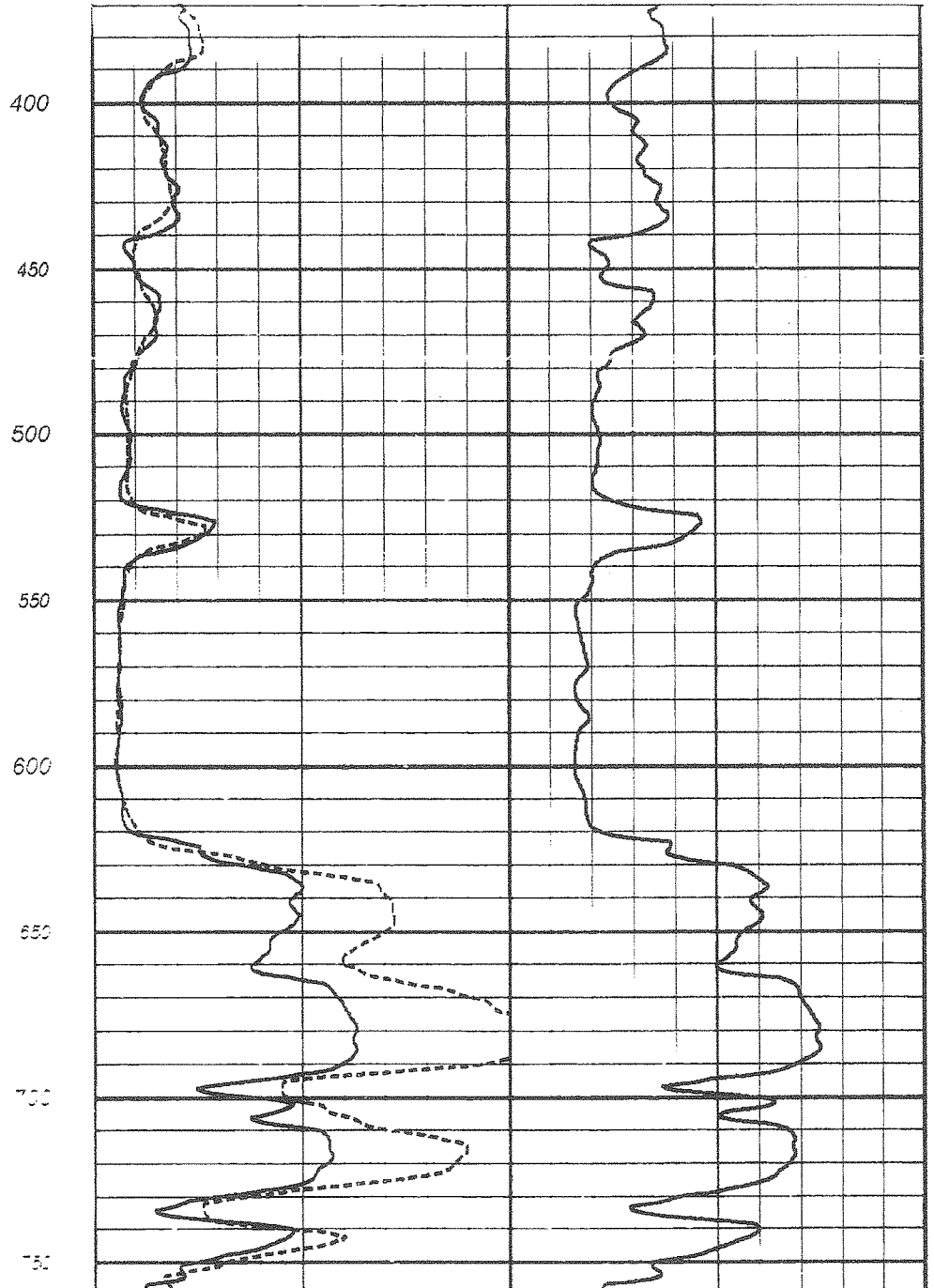
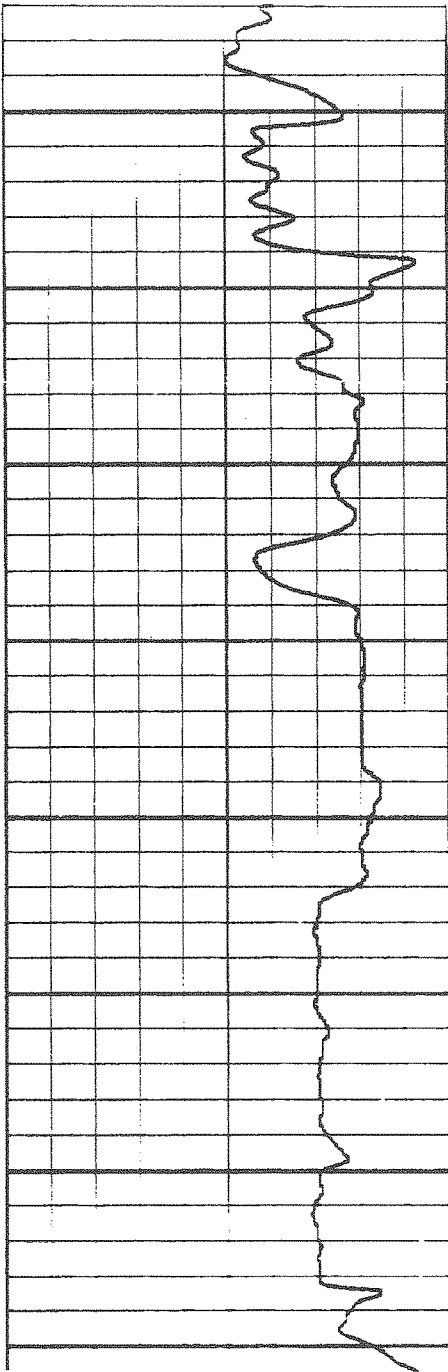
## GEOPHYSICAL WELL LOGS

2008

C



25 F





215/22E 33R

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ELECTRIC LOG

FILE NO.	COMPANY	WELL		FIELD		STATE		COUNTY		Kings		OTHER SERVICES:	
		Corcoran		California								None	
JOB NO.	Approx. .5 Mi. N. of dirt Quebec and dirt 7th												
SEC. 34 TWP. 21S RGE. 22E LAT. 38° 3' 27.0" LONG. 119° 35' 21.1" MERIDIAN: NAD 83		Permanent Datum		Ground Level		Elev.		Ft		Elev.: K.B.		Ft	
		Log Measured From:		Ground Level		0		Ft Above Perm. Datum		D.F.		Ft	
		Drilling Measured From:		Ground Level						G.L.		Ft	
Run	One												
Date	Jun. 12, 2008												
Depth-Driller													
Depth-Logger													
Top Logged Interval													
Btm. Logged Interval													
Casing-Driller	3.4												
Casing-Logger	32												
Bit Size	17.5												
Time On Bottom	15:15												
Type Fluid In Hole	Polybore												
Density													
Viscosity													
pH													
Fluid Loss													
Source of Sample	Pit												
Rem @ Measured Temp.	11.2 @ 75												
Surf @ Measured Temp.	11.2 @ 75												
Shw @ Measured Temp.													
Source Ref													
Rem @ BHT	3												
Time Since Circulation													
Max. Rec. Temp.													
Van No.	L-23												
Location	Bld												
Recorded By	Craig Corbell												
Witnessed By	Rick Crosby												

Miscellaneous Information

A recreational GPS accurate to +/- 45 feet set for Datum NAD83 was used to calculate Latitude, Longitude & Elevation values. The Section, Township, and Range then determined using the TRS program (TRS accuracy is not guaranteed). The TRS program converts Latitude and Longitude to Section, Township, and Range. The NOTICE at the bottom of this heading also applies.

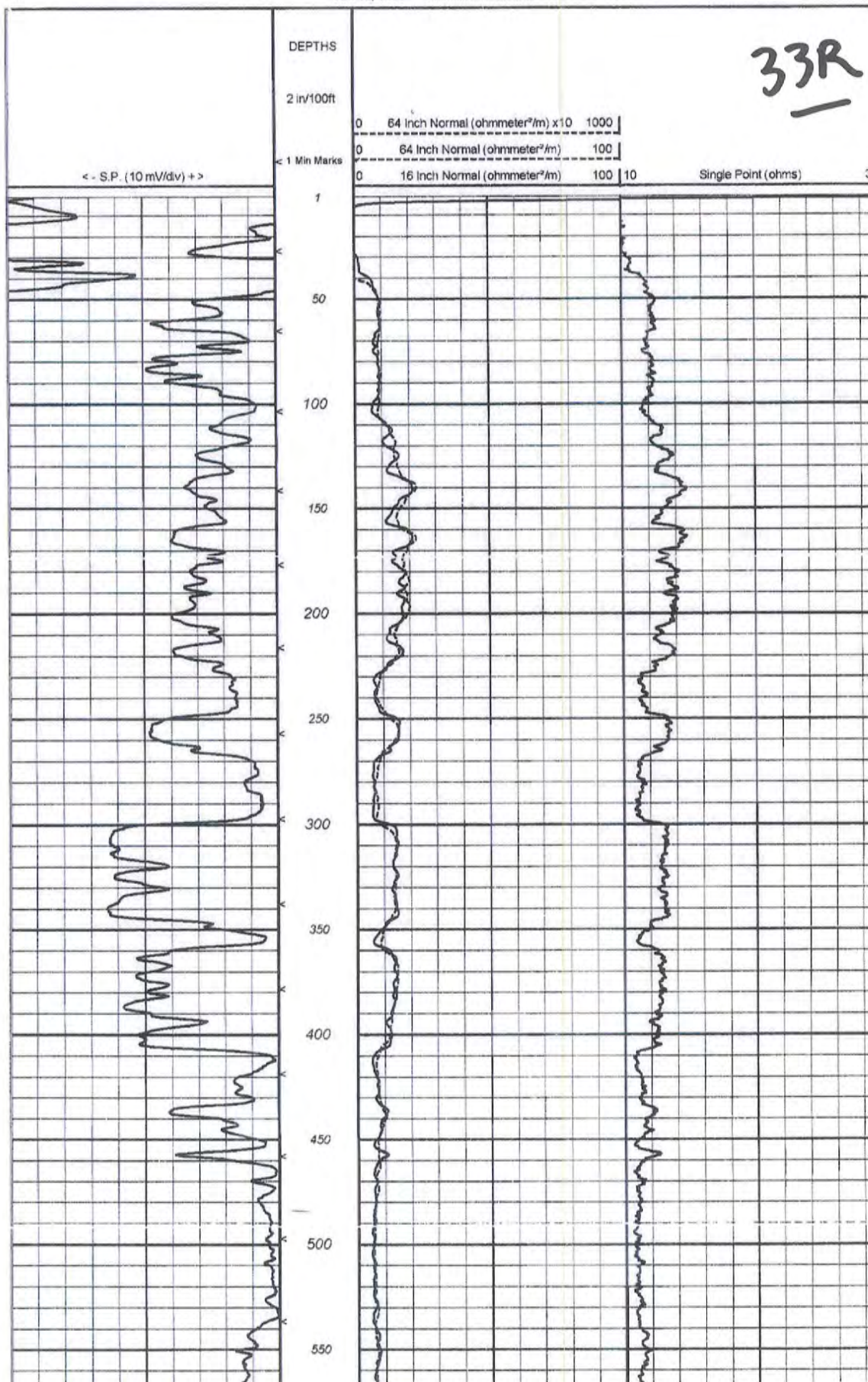
NOTICE

All interpretations are opinions based on inferences from electrical and other measurements and we do not guarantee the accuracy or correctness of any verbal or written interpretation, and we shall not, except in the case of gross or willful negligence on our part, be liable or responsible for any loss, costs, damages or expenses incurred or sustained by anyone resulting from any interpretation made by one of our officers, agents or employees. These interpretations are also subject to our General Terms and Conditions as set out in our current Price Schedule. welenco, inc. June 12, 2008

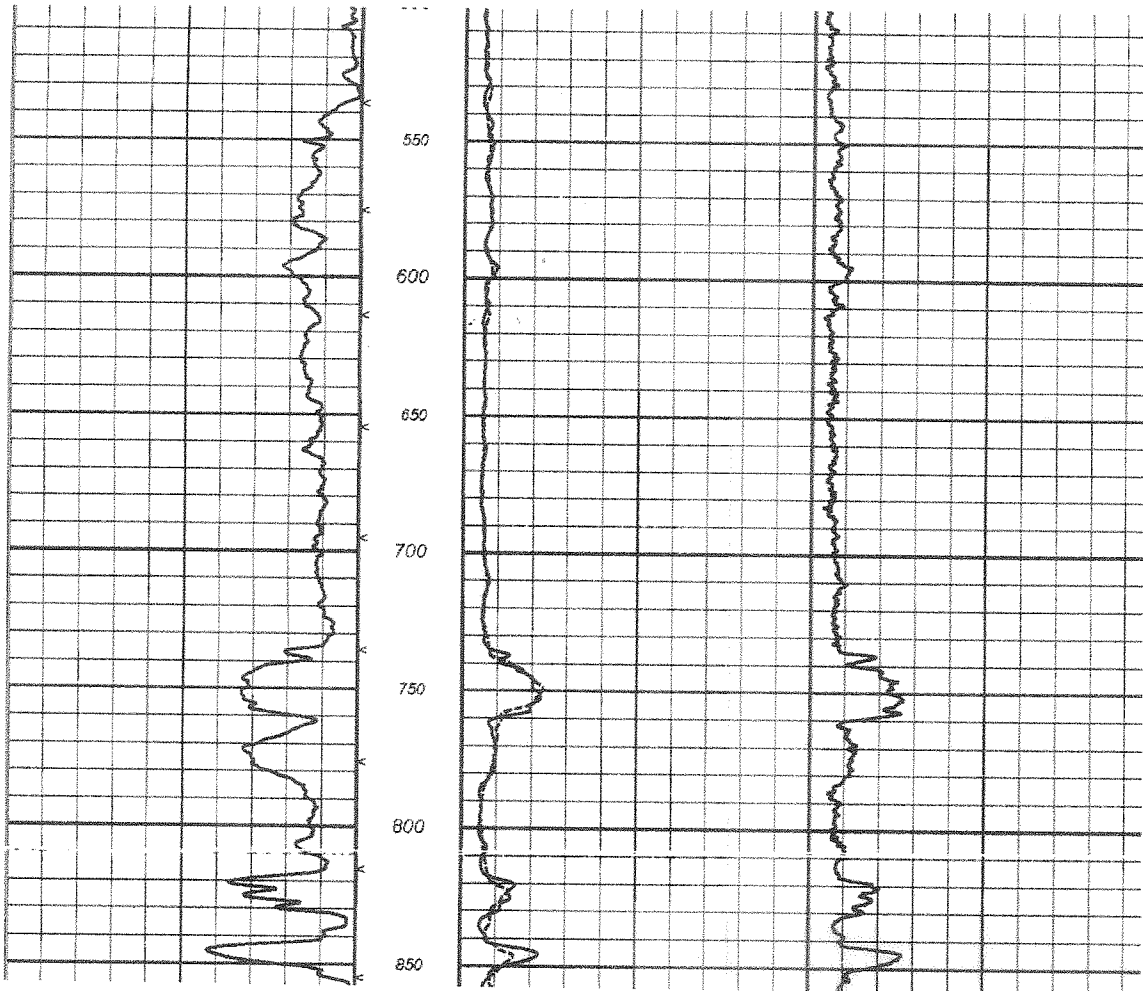
GEOPHYSICAL WELL LOGS



33R



33R



21S/22E 27N

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<b>ELECTRIC LOG</b>	
FILING NO.	COMPANY _____ WELL _____ FIELD <u>Corcoran</u> STATE <u>California</u> COUNTY <u>Kings</u> LOCATION: <u>The Northwest Corner of Paris and Avenue 7</u>
JOB NO. <u>9576</u>	OTHER SERVICES: <u>None</u>
SEC: <u>27</u> TWP: <u>21S</u> RGE: <u>22E</u> LAT.: <u>36° 3' 56.0"</u> LONG.: <u>119° 35' 22.0"</u> MERIDIAN.: <u>Mt. Diablo</u>	
Permanent Datum: <u>Ground Level</u> , Elev. _____ Ft. Elev.: K.B. _____ Ft. Log Measured From: <u>Ground Level</u> , <u>0</u> Ft. Above Perm. Datum D.F. _____ Ft. Drilling Measured From: <u>Ground Level</u> G.L. _____ Ft.	
Run	<u>One</u>
Date	<u>Jul. 10, 2008</u>
Depth-Driller	_____ Ft. _____ Ft. _____ Ft. _____ Ft.
Depth-Logger	_____ Ft. _____ Ft. _____ Ft. _____ Ft.
Top Logged Interval	<u>30</u> Ft. _____ Ft. _____ Ft. _____ Ft.
Btm. Logged Interval	_____ Ft. _____ Ft. _____ Ft. _____ Ft.
Casing-Driller	<u>32</u> In @ <u>40</u> Ft. _____ In @ _____ Ft. _____ In @ _____ Ft. _____ In @ _____ Ft.
Casing-Logger	_____ In @ <u>30</u> Ft. _____ In @ _____ Ft. _____ In @ _____ Ft. _____ In @ _____ Ft.
Bit Size	<u>17.5</u> In _____ In _____ In _____ In
Time On Bottom	<u>21:30</u>
Type Fluid In Hole	<u>Water</u>
Density	_____
Viscosity	_____
pH	_____
Fluid Loss	_____ ml _____ ml _____ ml _____ ml
Source of Sample	<u>Pit</u>
Rm @ Measured Temp.	<u>4.5</u> @ <u>75</u> °F _____ @ _____ °F _____ @ _____ °F _____ @ _____ °F
Rmf @ Measured Temp.	<u>3.6</u> @ <u>75</u> °F _____ @ _____ °F _____ @ _____ °F _____ @ _____ °F
Rmc @ Measured Temp.	_____ @ _____ °F _____ @ _____ °F _____ @ _____ °F _____ @ _____ °F
Source Rmf Rmc	<u>Meas</u>
Rm @ BHT	_____ @ _____ °F _____ @ _____ °F _____ @ _____ °F _____ @ _____ °F
Time Since Circulation	<u>3</u> Hr _____ Hr _____ Hr _____ Hr
Max. Rec. Temp.	_____ °F _____ °F _____ °F _____ °F
Van No.	<u>L-16</u>
Location	<u>Bfld</u>
Recorded By	<u>David Jackson</u>
Witnessed By	<u>Victor</u>



27N

ELECTRIC LOG

DEPTHS

2 in/100ft

0 64 Inch Normal (ohmmeter<sup>2</sup>/m) x10 1000

0 64 Inch Normal (ohmmeter<sup>2</sup>/m) 100

0 16 Inch Normal (ohmmeter<sup>2</sup>/m) x10 1000

0 16 Inch Normal (ohmmeter<sup>2</sup>/m) 100

Single Point (ohms)

50

< - S.P. (5 mV/div) + >

28

50

100

150

200

250

300

350

400



27N

ELECTRIC LOG

DEPTHS

2 in/100ft

0 64 Inch Normal (ohmmeter<sup>2</sup>/m) x10 1000

0 64 Inch Normal (ohmmeter<sup>2</sup>/m) 100

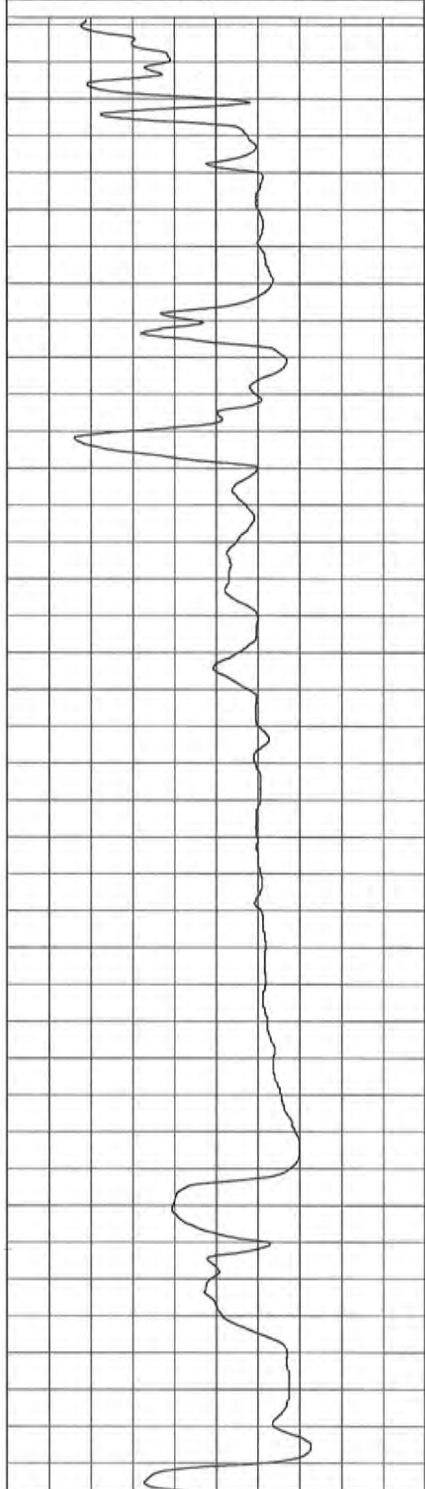
0 16 Inch Normal (ohmmeter<sup>2</sup>/m) x10 1000

0 16 Inch Normal (ohmmeter<sup>2</sup>/m) 100

Single Point (ohms)

50

< - S.P. (5 mV/div) + >



450

500

550

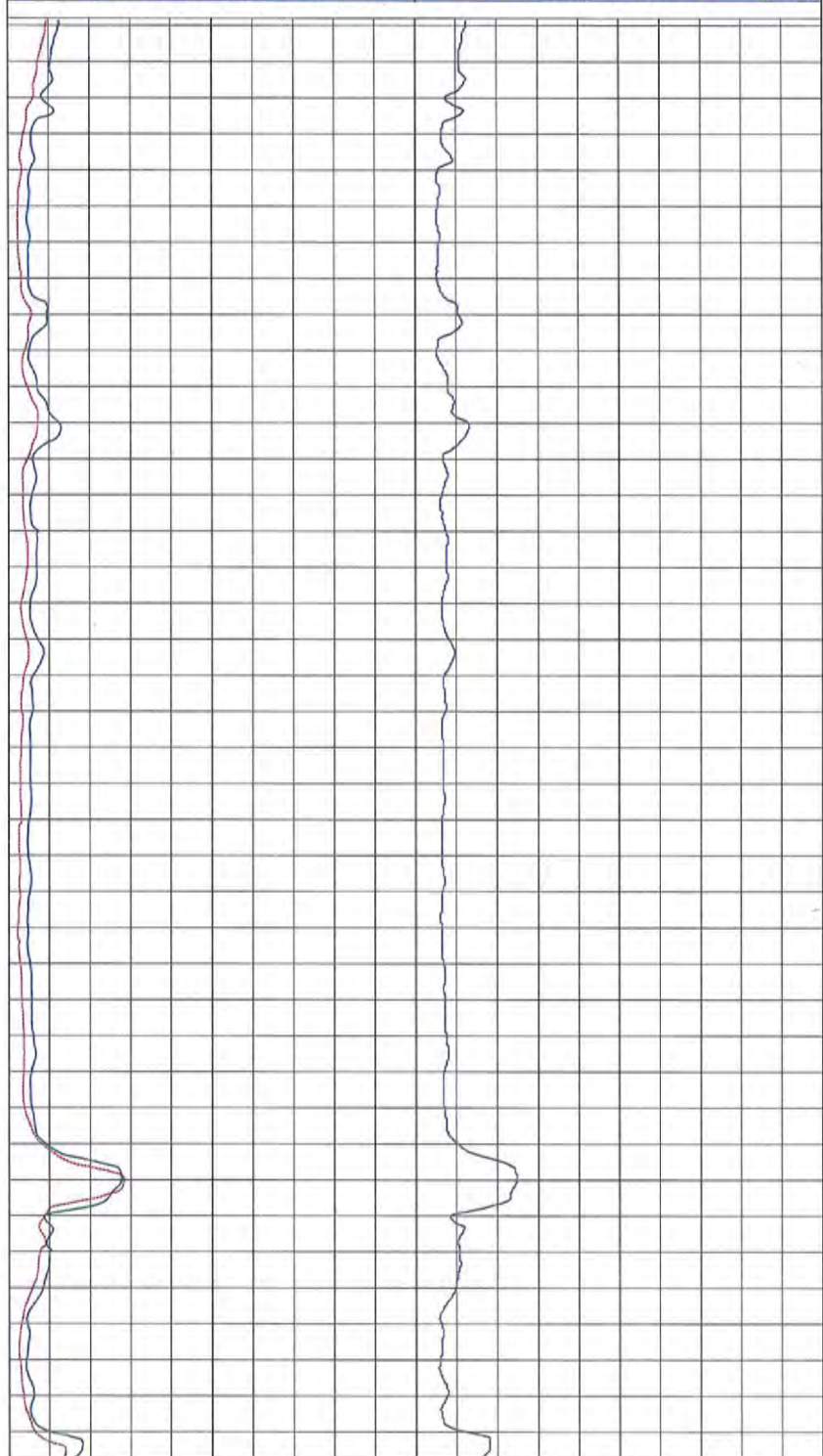
600

650

700

750

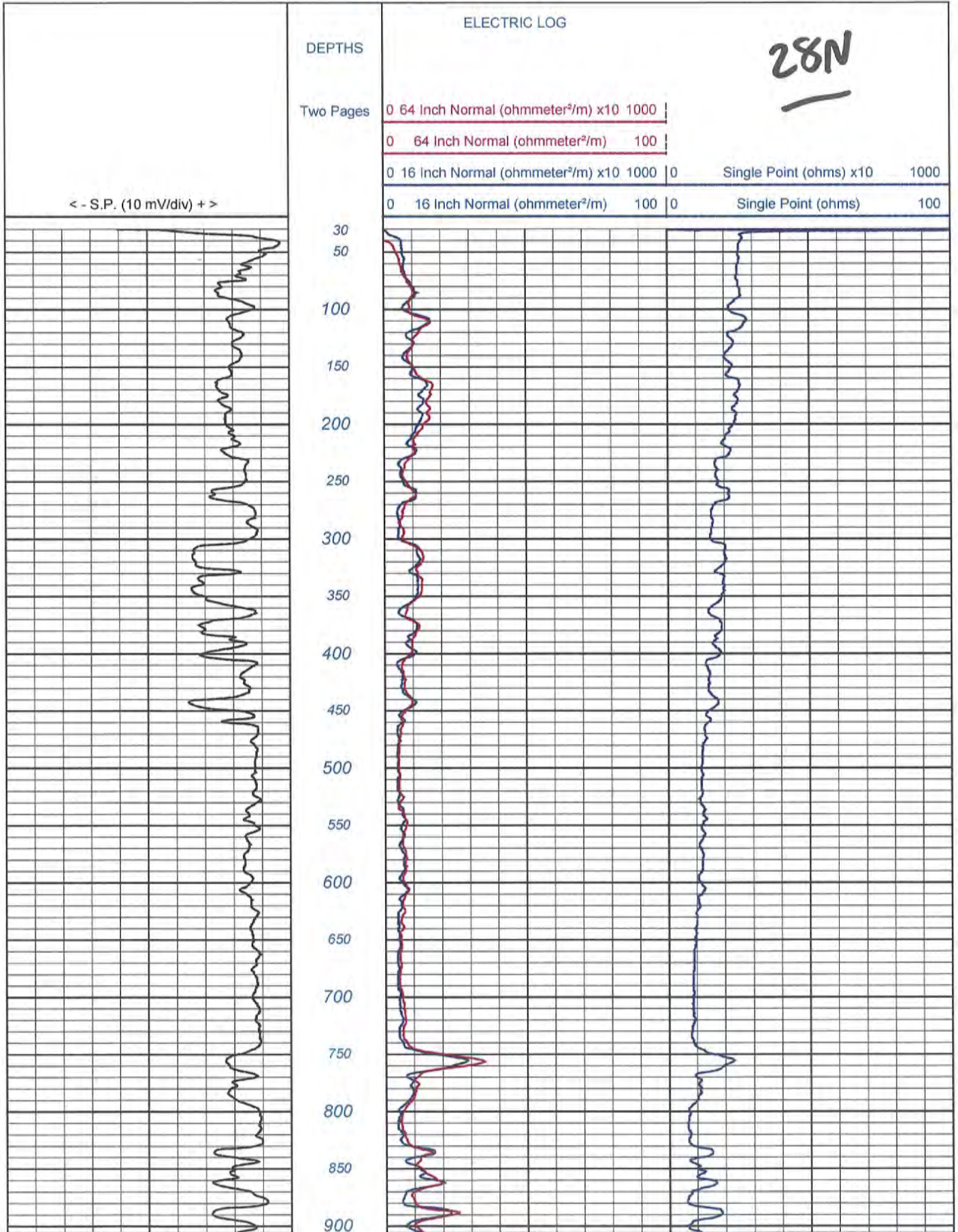
800



21S/22E 28N

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<b>ELECTRIC LOG</b>					
FILING NO.           JOB NO. 9778	COMPANY _____ WELL _____ FIELD <u>Corcoran</u> STATE <u>California</u> COUNTY <u>Tulare</u> LOCATION: <u>North of Paris on 8th Avenue</u> OTHER SERVICES: <u>None</u> SEC: <u>28</u> TWP: <u>21S</u> RGE: <u>22E</u> LAT.: <u>36° 4' 4.5"</u> LONG.: <u>119° 36' 27.0"</u> MERIDIAN.: <u>Mt. Diablo</u>				
Permanent Datum: <u>Ground Level</u> , Elev. <u>177</u> Ft. Elev.: K.B. _____ Ft. Log Measured From: <u>Ground Level</u> , <u>0</u> Ft. Above Perm. Datum D.F. _____ Ft. Drilling Measured From: <u>Ground Level</u> G.L. <u>177</u> Ft.					
Run	<u>One</u>				
Date	<u>Aug. 08, 2008</u>				
Depth-Driller		Ft		Ft	Ft
Depth-Logger		Ft		Ft	Ft
Top Logged Interval	<u>40</u>	Ft		Ft	Ft
Btm. Logged Interval		Ft		Ft	Ft
Casing-Driller	<u>32</u> In @ <u>40</u>	Ft	In @	Ft	In @ Ft
Casing-Logger		In @ <u>38</u> Ft	In @	Ft	In @ Ft
Bit Size	<u>17.5</u>	In		In	In
Time On Bottom	<u>19:00</u>				
Type Fluid In Hole	<u>Gel</u>				
Density	Viscosity				
pH	Fluid Loss	ml	ml	ml	ml
Source of Sample	<u>Pit</u>				
Rm @ Measured Temp.	<u>5.1</u> @ <u>75</u> °F	@ °F	@ °F	@ °F	@ °F
Rmf @ Measured Temp.	<u>4.1</u> @ <u>75</u> °F	@ °F	@ °F	@ °F	@ °F
Rmc @ Measured Temp.	@ °F	@ °F	@ °F	@ °F	@ °F
Source Rmf	<u>Meas</u>				
Rm @ BHT	@ °F	@ °F	@ °F	@ °F	@ °F
Time Since Circulation	<u>5.0</u> Hr	Hr	Hr	Hr	Hr
Max. Rec. Temp.	<u>N/A</u> °F	°F	°F	°F	°F
Van No.	Location	<u>L-16</u> <u>Bfid</u>			
Recorded By	<u>David Jackson</u>				
Witnessed By	<u>Rick Crosby</u>				

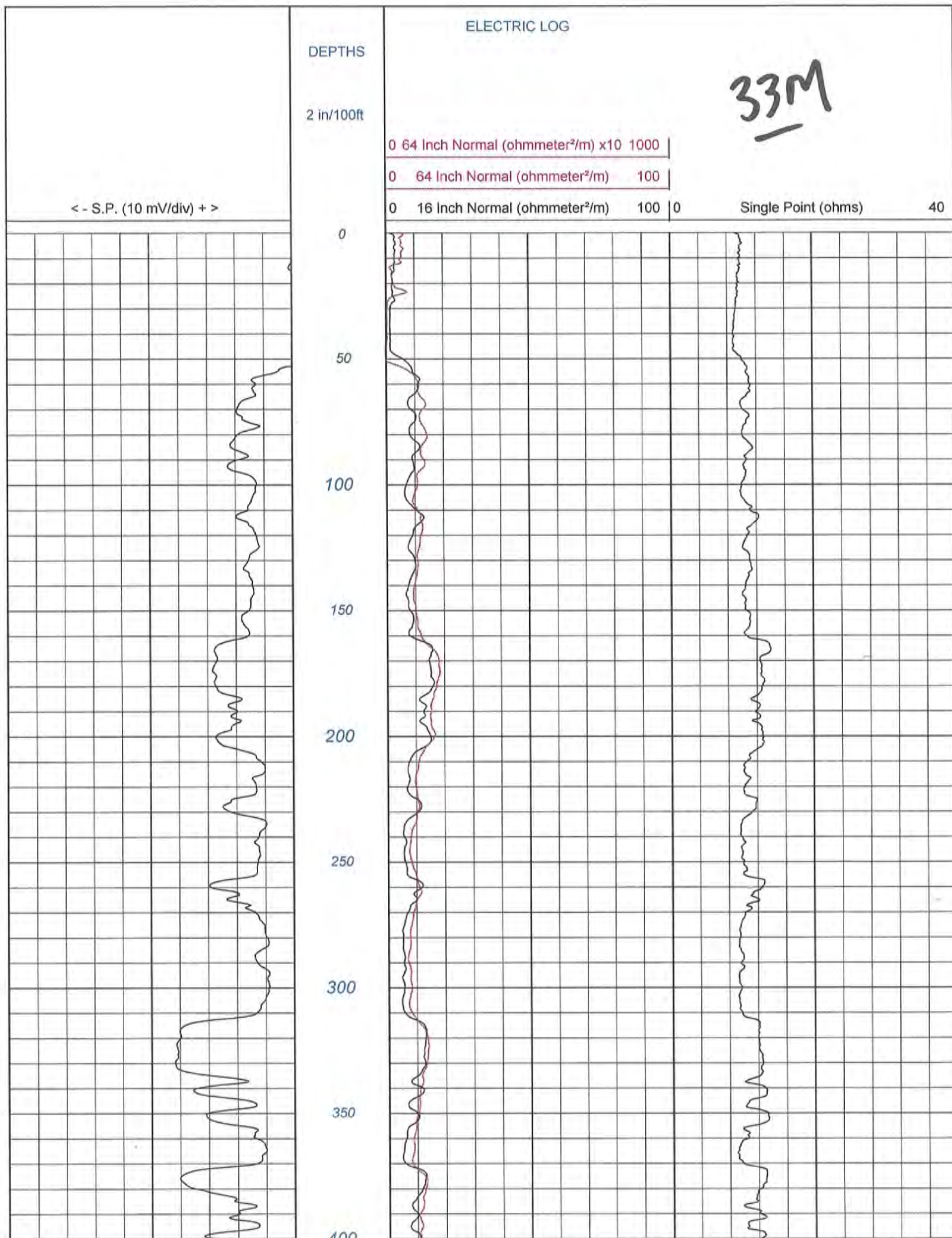


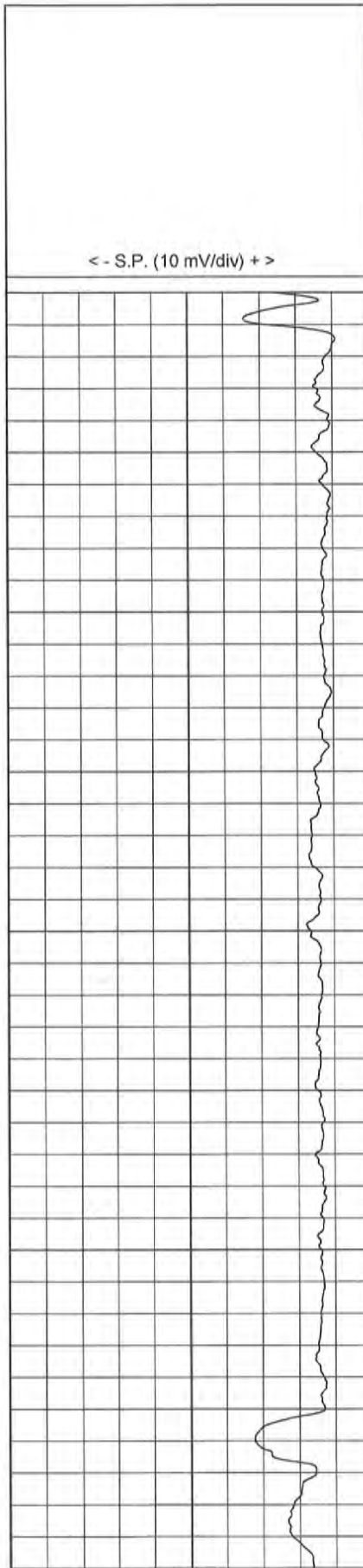


21S/22E 33M

5201 Woodmere Drive, Bakersfield, CA 93313-- www.welenco.com--(800) 445-9914 California Contractor's License No. 722373	
<b>ELECTRIC LOG</b>	
FILING NO.	COMPANY _____ WELL _____ FIELD <u>Corcoran</u> STATE <u>California</u> COUNTY <u>Kings</u> LOCATION: <u>Dirt 8th between Paris and Quebec</u>
JOB NO. <b>11705</b>	OTHER SERVICES: <u>None</u>
SEC: <u>33</u> TWP: <u>21S</u> RGE: <u>22E</u> LAT.: <u>36° 3' 20.5"</u> LONG.: <u>119° 36' 26.1"</u> MERIDIAN.: <u>Mt. Diablo</u>	
Permanent Datum: <u>Ground Level</u> , Elev. _____ Ft. Elev.: K.B. _____ Ft. Log Measured From: <u>Ground Level</u> , <u>0</u> Ft. Above Perm. Datum D.F. _____ Ft. Drilling Measured From: <u>Ground Level</u> G.L. _____ Ft.	
Run	<u>One</u>
Date	<u>Jun. 28, 2009</u>
Depth-Driller	_____ Ft. _____ Ft. _____ Ft. _____ Ft.
Depth-Logger	_____ Ft. _____ Ft. _____ Ft. _____ Ft.
Top Logged Interval	<u>0</u> _____ Ft. _____ Ft. _____ Ft. _____ Ft.
Btm. Logged Interval	_____ Ft. _____ Ft. _____ Ft. _____ Ft.
Casing-Driller	<u>32</u> In @ <u>50</u> Ft. _____ In @ _____ Ft. _____ In @ _____ Ft. _____ In @ _____ Ft.
Casing-Logger	<u>32</u> In @ <u>50</u> Ft. _____ In @ _____ Ft. _____ In @ _____ Ft. _____ In @ _____ Ft.
Bit Size	<u>17.5</u> In _____ In _____ In _____ In
Time On Bottom	<u>05:45 AM</u>
Type Fluid In Hole	<u>Gel</u>
Density	_____
Viscosity	_____
pH	_____
Fluid Loss	_____ ml _____ ml _____ ml _____ ml
Source of Sample	<u>Tank</u>
Rm @ Measured Temp.	<u>5.9</u> @ <u>75</u> °F _____ @ _____ °F _____ @ _____ °F _____ @ _____ °F
Rmf @ Measured Temp.	<u>5.3</u> @ <u>75</u> °F _____ @ _____ °F _____ @ _____ °F _____ @ _____ °F
Rmc @ Measured Temp.	_____ @ _____ °F _____ @ _____ °F _____ @ _____ °F _____ @ _____ °F
Source Rmf Rmc	<u>meas</u>
Rm @ BHT	_____ @ _____ °F _____ @ _____ °F _____ @ _____ °F _____ @ _____ °F
Time Since Circulation	<u>5.0</u> Hr _____ Hr _____ Hr _____ Hr
Max. Rec. Temp.	<u>N/A</u> °F _____ °F _____ °F _____ °F
Van No. Location	<u>LV-1</u> <u>Bfid</u>
Recorded By	<u>Dan Ihde</u>
Witnessed By	<u>Victor Olveda</u>







Log Page No. 2

DEPTHS

2 in/100ft

400

450

500

550

600

650

700

750

800

ELECTRIC LOG

33M

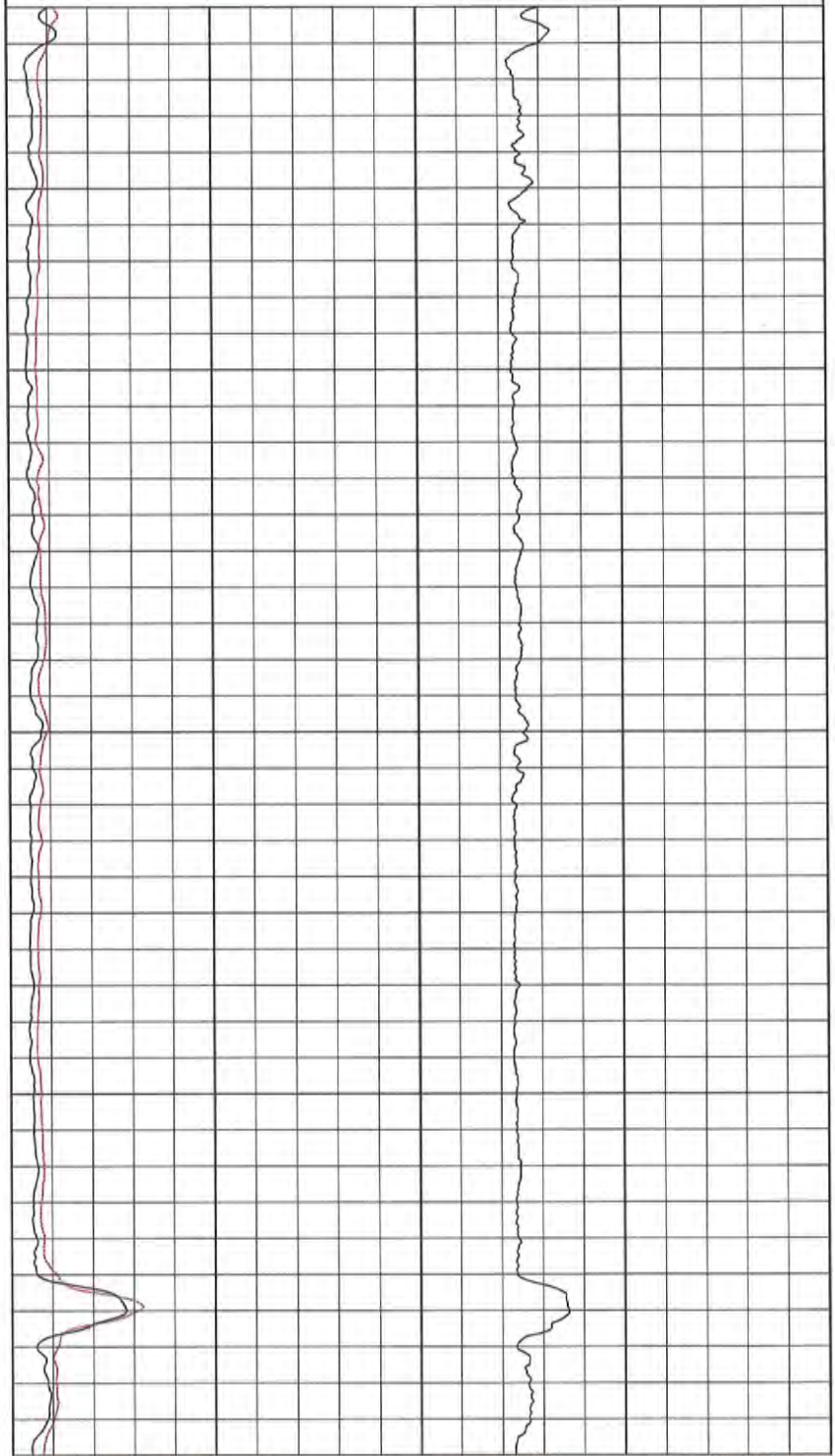
0 64 Inch Normal (ohmmeter<sup>2</sup>/m) x10 1000

0 64 Inch Normal (ohmmeter<sup>2</sup>/m) 100

0 16 Inch Normal (ohmmeter<sup>2</sup>/m) 100 0

Single Point (ohms)

40



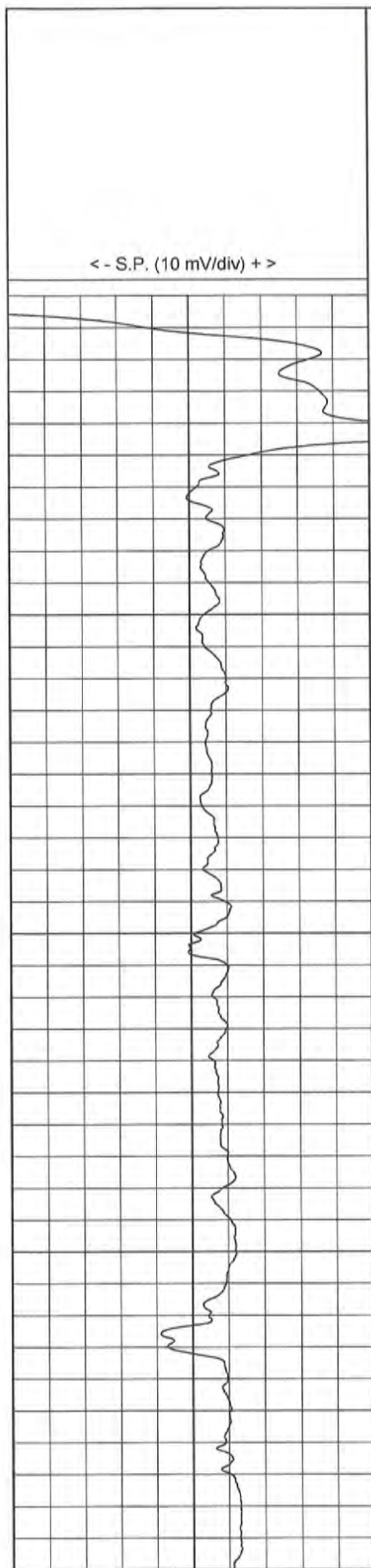
Page Length: 400 - 800 Feet (400 Feet)

Time: 07:16:58 AM

Date: Jun 28, 2009







Log Page No. 1

DEPTHS

2 in/100ft

0

50

100

150

200

250

300

350

400

# ELECTRIC LOG

SE  
—

0 64 Inch Normal (ohmmeter<sup>2</sup>/m) x10 1000

0 64 Inch Normal (ohmmeter<sup>2</sup>/m) 100

0 16 Inch Normal (ohmmeter<sup>2</sup>/m) 100

0

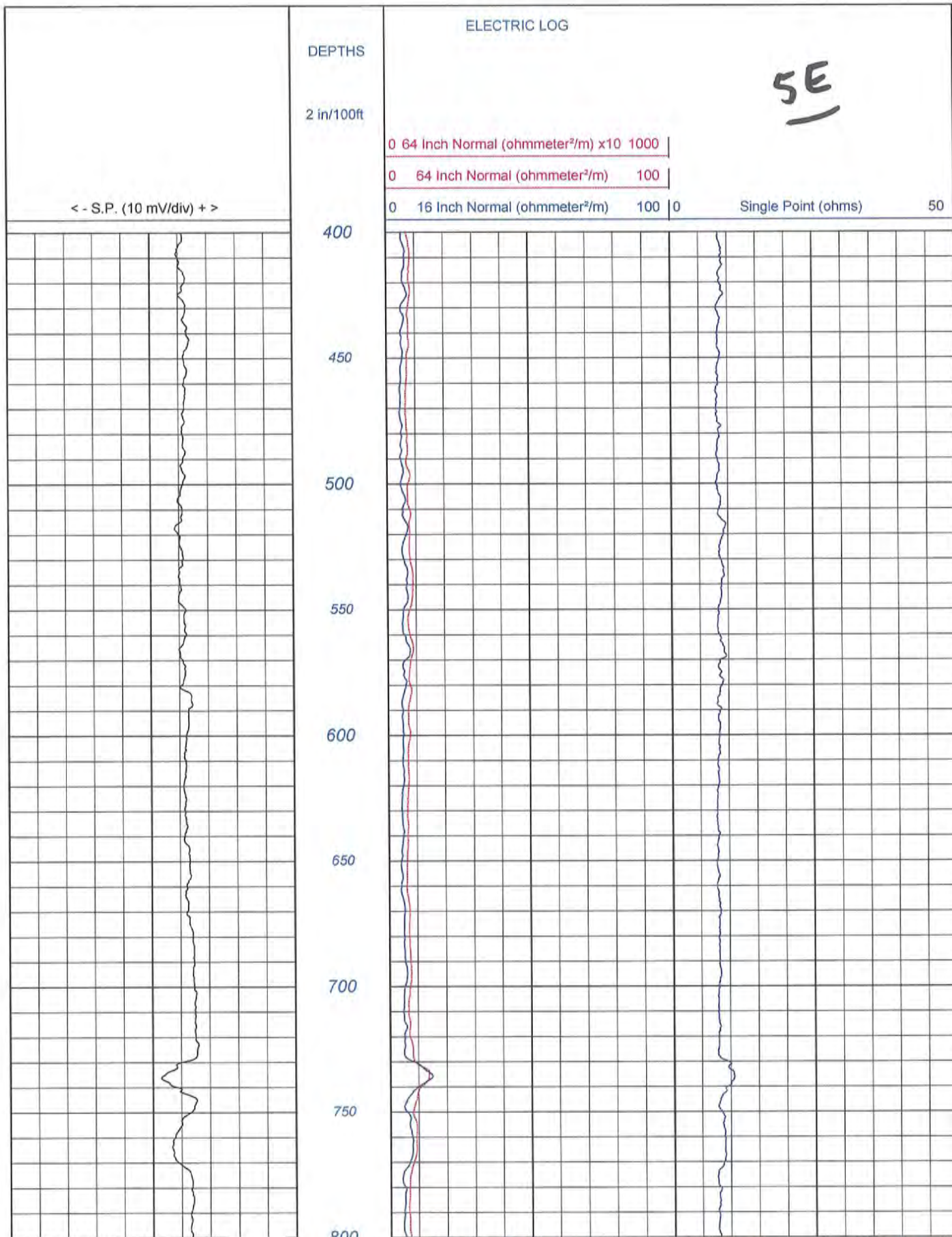
Single Point (ohms)

50

Page Length: 0 - 400 Feet (400 Feet)

Time: 07:46:44 AM

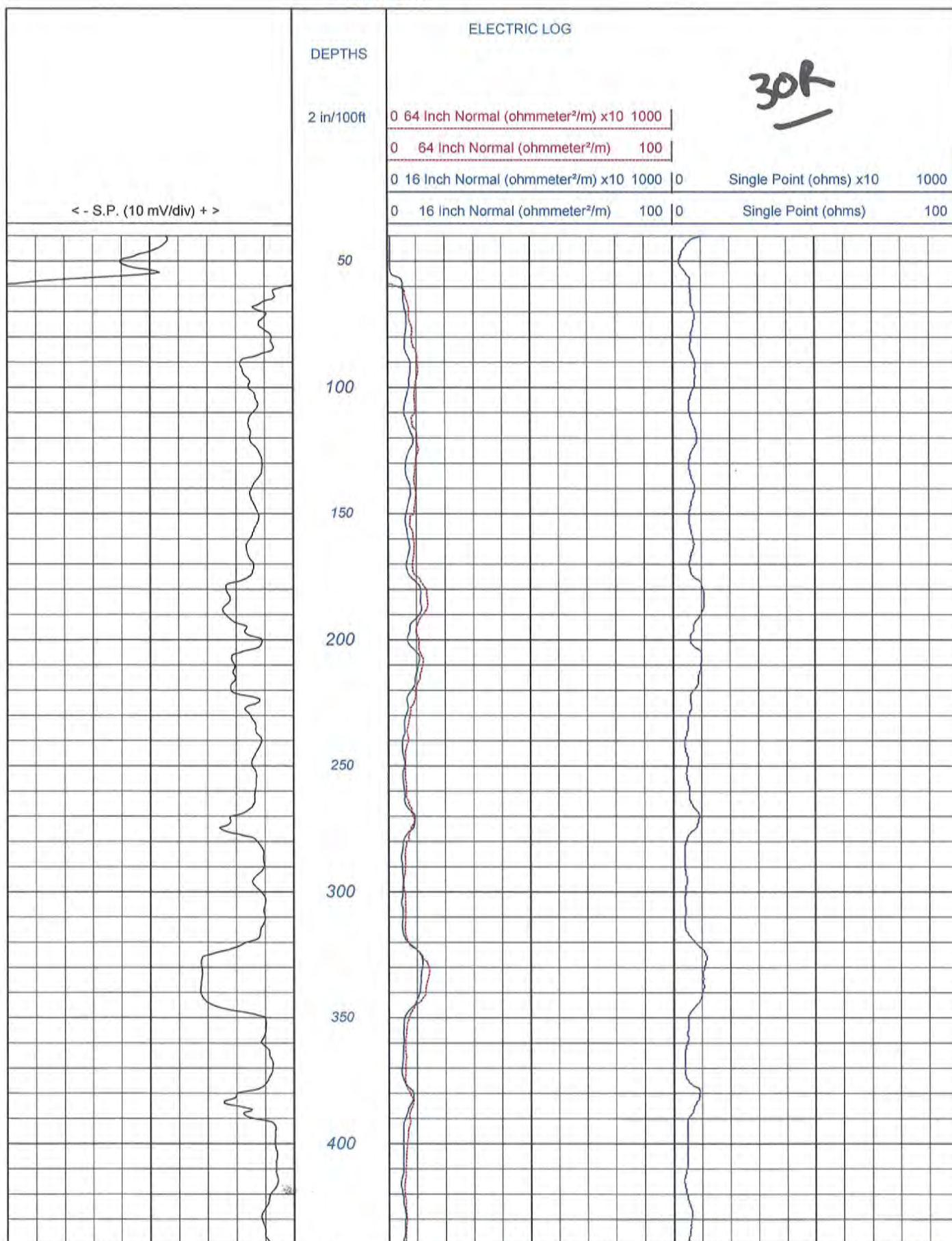
Date: Apr 29, 2010



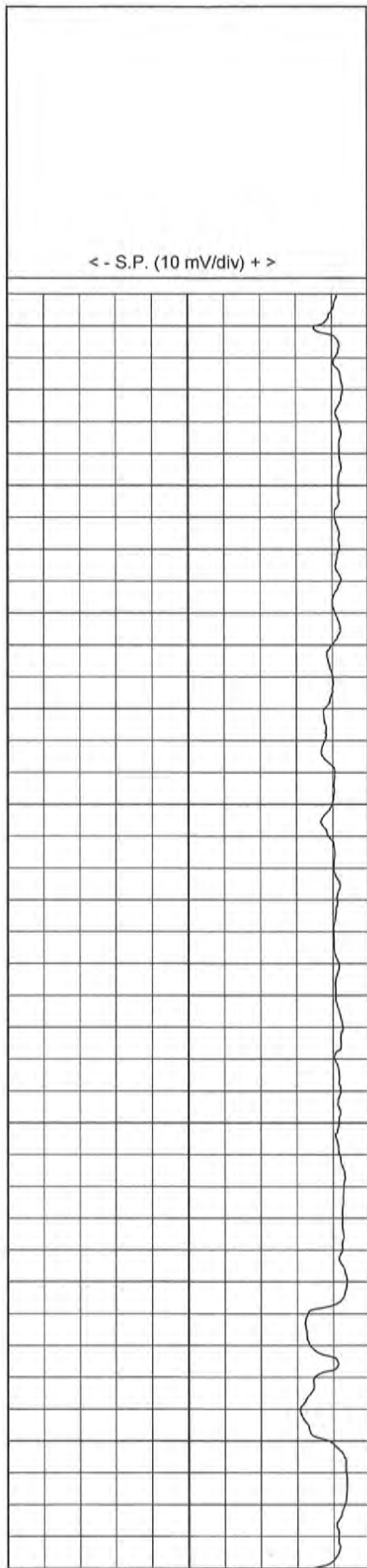


21S/22E 30R

5201 Woodmere Drive, Bakersfield, CA 93313-- www.welenco.com--(800) 445-9914 California Contractor's License No. 722373					
<b>ELECTRIC LOG</b>					
FILING NO.	COMPANY _____ WELL _____ FIELD <u>Corcoran</u> STATE <u>California</u> COUNTY <u>Kings</u> LOCATION: <u>3 Miles West of Avenue 6</u> <u>.05 Mile North of Paris</u>				
JOB NO. <b>13413</b>	OTHER SERVICES: <u>None</u> SEC: <u>29</u> TWP: <u>21S</u> RGE: <u>22E</u> LAT.: <u>36° 3' 56.0"</u> LONG.: <u>119° 37' 31.0"</u> MERIDIAN.: <u>Mt. Diablo</u>				
Permanent Datum: <u>Ground Level</u> , Elev. _____ Ft. Elev.: K.B. _____ Ft. Log Measured From: <u>Drilling Table</u> , <u>6</u> Ft. Above Perm. Datum D.F. _____ Ft. Drilling Measured From: <u>Drilling Table</u> G.L. _____ Ft.					
Run	<u>One</u>				
Date	<u>May. 30, 2010</u>				
Depth-Driller		Ft	Ft	Ft	Ft
Depth-Logger		Ft	Ft	Ft	Ft
Top Logged Interval	<u>56</u>	Ft	Ft	Ft	Ft
Btm. Logged Interval		Ft	Ft	Ft	Ft
Casing-Driller	<u>32</u> In @ <u>40</u>	Ft	In @	Ft	In @
Casing-Logger		In @ <u>56</u>	Ft	In @	Ft
Bit Size	<u>17.5</u>	In	In	In	In
Time On Bottom	<u>17:12</u>				
Type Fluid In Hole	<u>Water</u>				
Density					
Viscosity					
pH		ml	ml	ml	ml
Fluid Loss					
Source of Sample	<u>Pit</u>				
Rm @ Measured Temp.	<u>7.1</u> @ <u>75</u>	°F	@	°F	@
Rmf @ Measured Temp.	<u>7.1</u> @ <u>75</u>	°F	@	°F	@
Rmc @ Measured Temp.		°F	@	°F	@
Source Rmf	<u>Meas</u>				
Rmc					
Rm @ BHT		°F	@	°F	@
Time Since Circulation	<u>3.5</u>	Hr	Hr	Hr	Hr
Max. Rec. Temp.		°F	°F	°F	°F
Van No.	<u>L-15</u>				
Location	<u>Bfld</u>				
Recorded By	<u>David Jackson</u>				
Witnessed By	<u>Victor</u>				







DEPTHS

2 in/100ft

ELECTRIC LOG

30R

0 64 Inch Normal (ohmmeter<sup>2</sup>/m) x10 1000

0 64 Inch Normal (ohmmeter<sup>2</sup>/m) 100

0 16 Inch Normal (ohmmeter<sup>2</sup>/m) x10 1000

0 Single Point (ohms) x10 1000

0 16 Inch Normal (ohmmeter<sup>2</sup>/m) 100

0 Single Point (ohms) 100

450

500

550

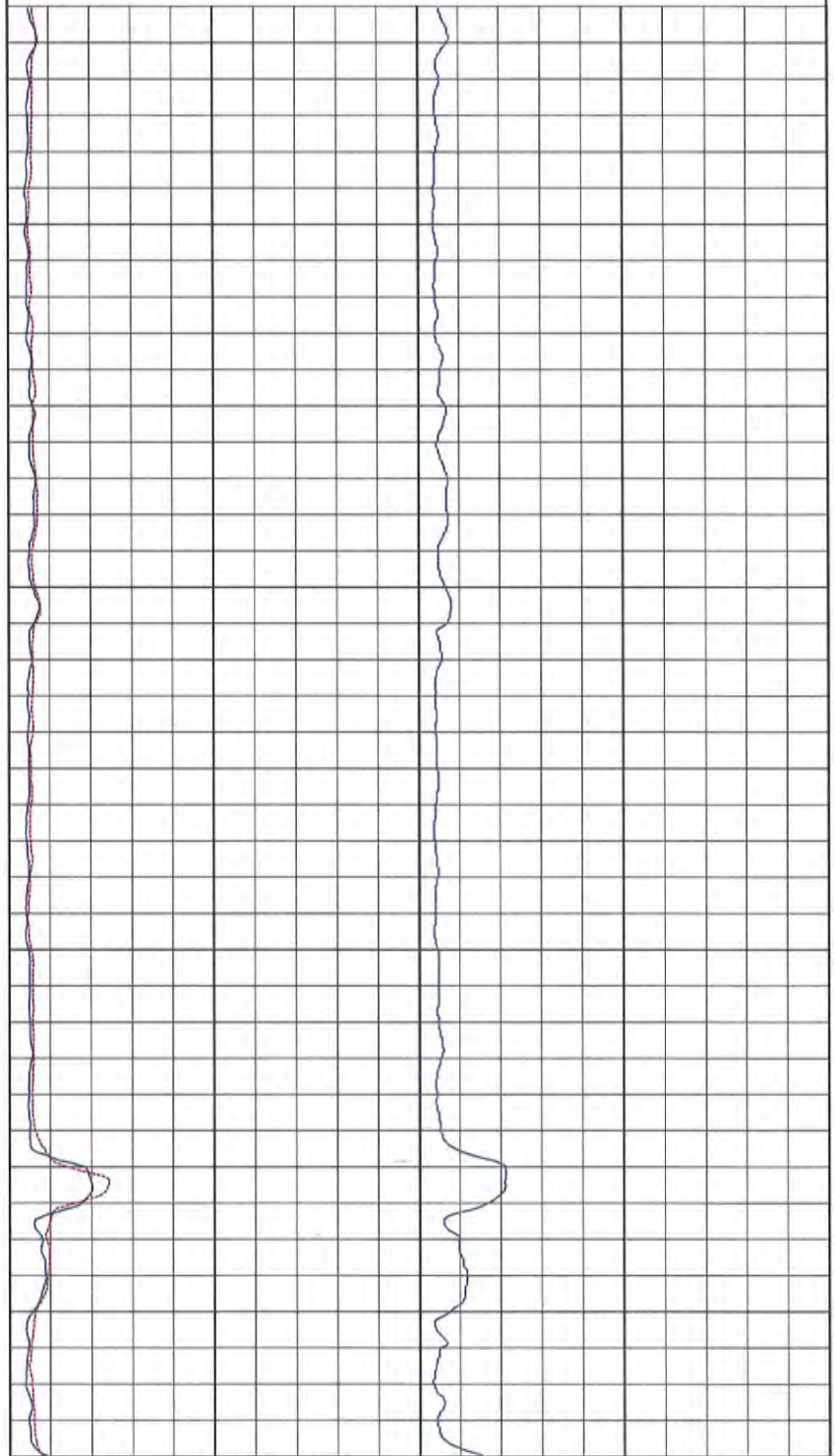
600

650

700

750

800





welenco

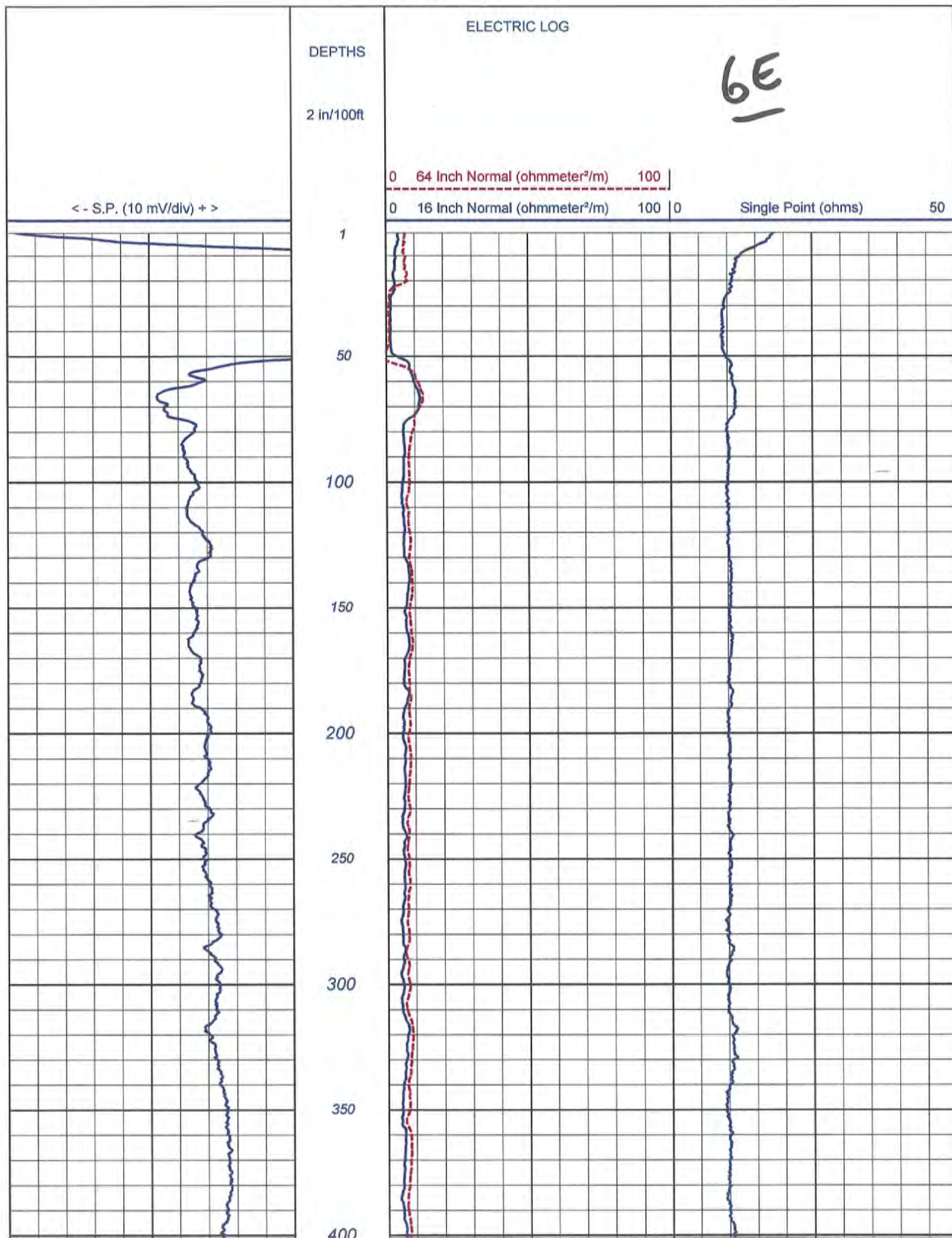
5201 Woodmere Drive, Bakersfield, CA 93313-- www.welenco.com--(800) 445-9914  
 California Contractor's License No. 722373

ELECTRIC LOG

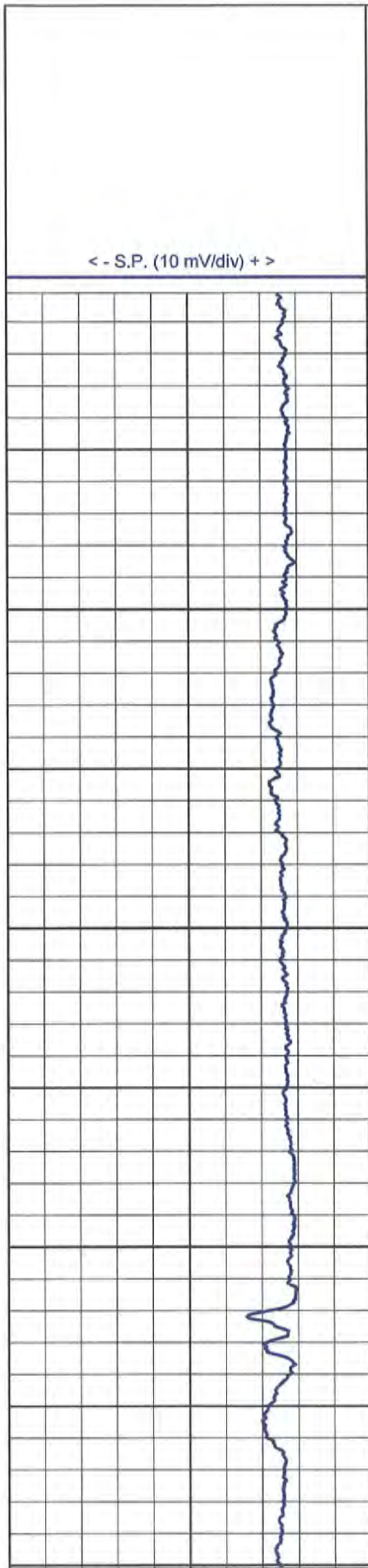
FILING NO.	COMPANY _____  WELL _____  FIELD <u>Corcoran</u>  STATE <u>California</u> COUNTY <u>Kings</u>  LOCATION: <u>East side of 10th Ave. on North bank of canal, 1.5 miles South of Paris.</u>					OTHER SERVICES: <u>None</u>
JOB NO. <u>17146</u>	SEC: <u>6</u> TWP: <u>22S</u> RGE: <u>22E</u> LAT.: <u>36° 2' 38.0"</u> LONG.: <u>119° 38' 31.4"</u> MERIDIAN.: <u>Mt. Diablo</u>					

Permanent Datum: Ground Level, Elev. 175 Ft. Elev.: K.B. \_\_\_\_\_ Ft.  
 Log Measured From: Ground Level, 0 Ft. Above Perm. Datum D.F. \_\_\_\_\_ Ft.  
 Drilling Measured From: Ground Level G.L. 175 Ft.

Run	One				
Date	Nov. 21, 2010				
Depth-Driller		Ft	Ft	Ft	Ft
Depth-Logger		Ft	Ft	Ft	Ft
Top Logged Interval	0	Ft	Ft	Ft	Ft
Btm. Logged Interval		Ft	Ft	Ft	Ft
Casing-Driller	32 In @ 50	Ft	In @	Ft	In @
Casing-Logger	32 In @ 50	Ft	In @	Ft	In @
Bit Size	17.5	In	In	In	In
Time On Bottom	10:30 PM				
Type Fluid In Hole	Bentonite				
Density	Viscosity				
pH	Fluid Loss	ml	ml	ml	ml
Source of Sample	Tank				
Rm @ Measured Temp.	12.8 @ 75	°F	@	°F	@
Rmf @ Measured Temp.	11.6 @ 75	°F	@	°F	@
Rmc @ Measured Temp.	@	°F	@	°F	@
Source Rmf Rmc	meas				
Rm @ BHT	@	°F	@	°F	@
Time Since Circulation	5.0	Hr	Hr	Hr	Hr
Max. Rec. Temp.	N/A	°F	°F	°F	°F
Van No.	Location	LV-1	Bfld		
Recorded By	Dan Ihde				
Witnessed By	Victor Olveda				







Log Page No. 2

DEPTHS

2 in/100ft

450

500

550

600

650

700

750

800

ELECTRIC LOG

6E

0 64 Inch Normal (ohmmeter<sup>2</sup>/m) 100

0 16 Inch Normal (ohmmeter<sup>2</sup>/m) 100 | 0

Single Point (ohms)

50



Page Length: 401 - 801 Feet (400 Feet)

Time: 12:50:56 AM

Date: Nov 22, 2010

225/226 SH

PACIFIC SURVEYS

ELECTRIC LOG  
GAMMA-RAY

Job No. 16838	Company	Well	Field	County	TULARE	State	CA
File No.			CORCORAN				
Location: 1.5 MILES SOUTH OF INTERSECTION OF PARIS AND 8TH AVE GPS: N 36o 02.639' W 119o 36.492'				Other Services: NONE			
Sec.	Twp.	Rge.					
Permanent Datum	G.L.	Elevation	164'	Elevation			
Log Measured From	G.L.	0'	above perm. datum	K.B. G.L.			
Drilling Measured From	G.L.						
Date	10-20-2012						
Run Number	ONE						
Depth Driller							
Depth Logger							
Bottom Logged Interval							
Top Log Interval	v						
Casing Driller	32" @ 67'						
Casing Logger	67'						
Bit Size	17.5'						
Type Fluid In Hole	BENTONITE						
Density / Viscosity	N/A						
pH / Fluid Loss	N/A						
Source of Sample	TANK						
Rm @ Meas. Temp	8.2 @ 77F						
Rmf @ Meas. Temp	8.2 @ 77F						
Rmc @ Meas. Temp	N/A						
Source of Rmf / Rmc	MEASURE						
Rm @ BHT	N/A						
Time Circulation Stopped	1300						
Time Logger on Bottom	1845						
Max. Recorded Temperature	N/A						
Equipment Number	PS-3						
Location	LA						
Recorded By	SCHUMACHER						
Witnessed By	--						

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All interpretations are opinions based on inferences from electrical or other measurements and we cannot and do not guarantee the accuracy or correctness of any interpretation, and we shall not, except in the case of gross or willful negligence on our part, be liable or responsible for any loss, costs, damages, or expenses incurred or sustained by anyone resulting from any interpretation made by any of our officers, agents or employees. These interpretations are also subject to our general terms and conditions set out in our current Price Schedule.

Comments



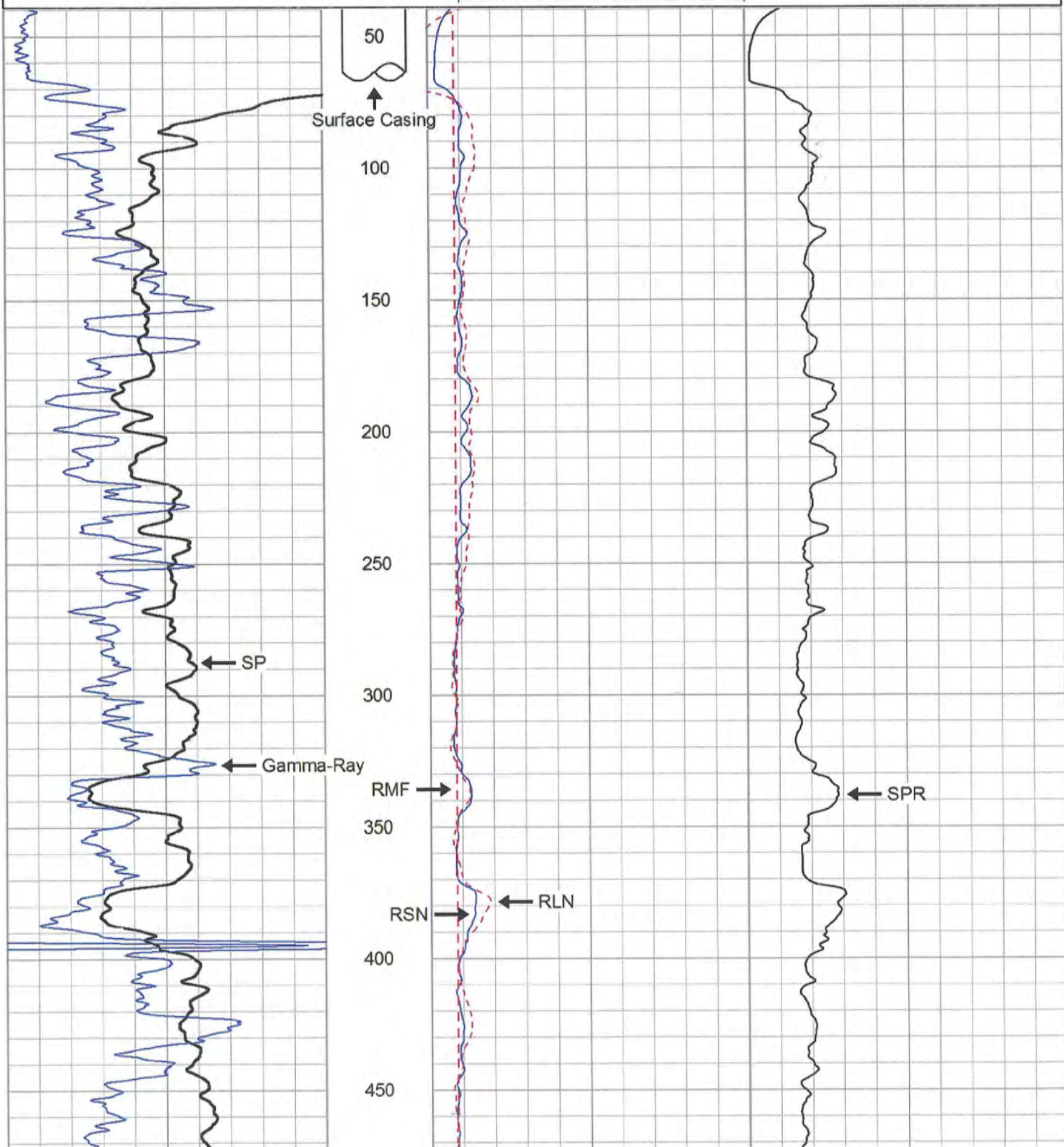
Database File 16838.db  
Dataset Pathname ELOG.1  
Presentation Format elog  
Dataset Creation Sat Oct 20 20:42:53 2012  
Charted by Depth in Feet scaled 1:600

5H

-5	SP (mV)	45
20	Gamma-Ray (GAPI)	120

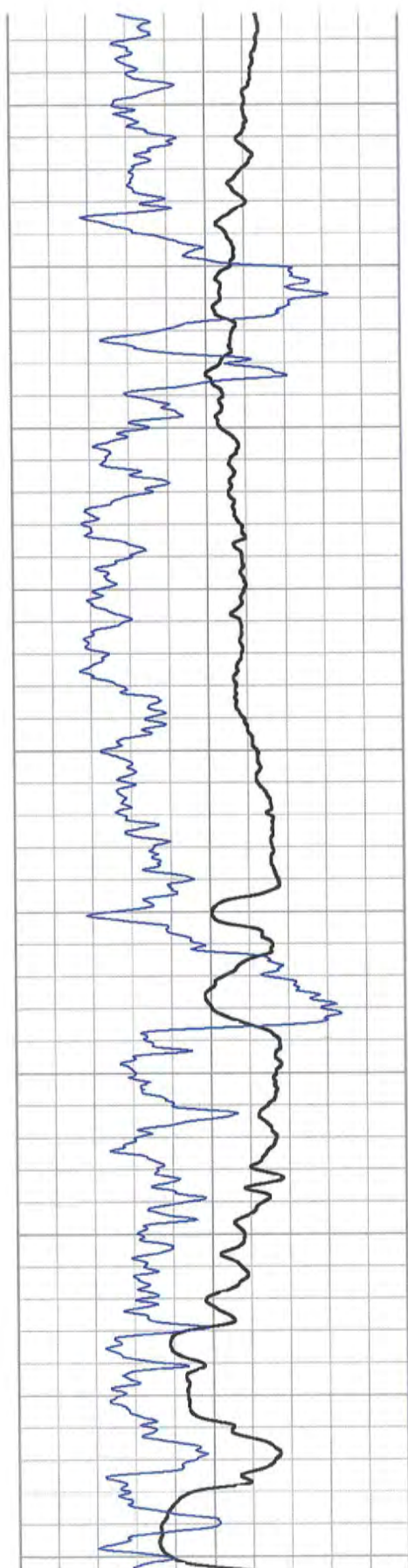
0	RSN (Ohm-m)	100
0	RLN (Ohm-m)	100
0	RMF (Ohm-m)	100
100	RSN x 10 (Ohm-m)	1000
100	RLN x 10 (Ohm-m)	1000

3	SPR (Ohm-m)	28
---	-------------	----





5H



500

550

600

650

700

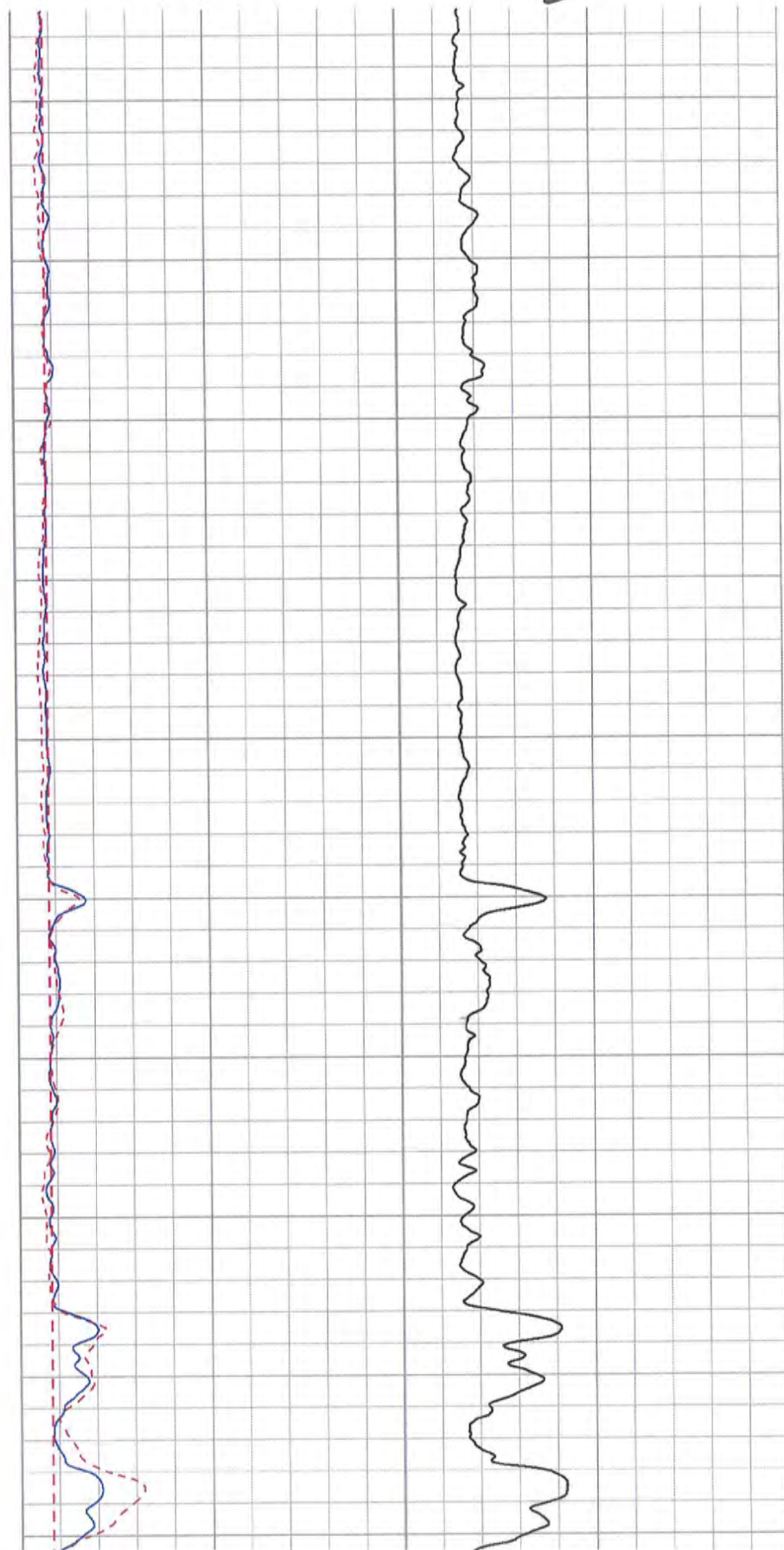
750

800

850

900

950



21S / 22E 30N

5201 Woodmere Drive, Bakersfield, CA 93313-- www.welenco.com--(800) 445-9914 California Contractor's License No. 722373				
<b>ELECTRIC LOG</b>				
FILING NO.	COMPANY _____ WELL _____ FIELD <u>Corcoran</u> STATE <u>California</u> COUNTY <u>Kings</u> LOCATION: <u>10th Ave. and Paris Ave.</u>			
JOB NO. <b>16426</b>	OTHER SERVICES: <b>None</b>			
SEC: <u>30</u> TWP: <u>21S</u> RGE: <u>22E</u> LAT.: <u>36° 3' 55.8"</u> LONG.: <u>119° 38' 36.2"</u> MERIDIAN.: <u>Mt. Diablo</u>				
Permanent Datum: <u>Ground Level</u> , Elev. <u>160</u> Ft. Elev.: K.B. _____ Ft. Log Measured From: <u>Ground Level</u> , <u>0</u> Ft. Above Perm. Datum D.F. _____ Ft. Drilling Measured From: <u>Ground Level</u> G.L. <u>160</u> Ft.				
Run	One			
Date	Jun. 06, 2012			
Depth-Driller		Ft	Ft	Ft
Depth-Logger		Ft	Ft	Ft
Top Logged Interval	0	Ft	Ft	Ft
Btm. Logged Interval		Ft	Ft	Ft
Casing-Driller	32 In @ 50	Ft	In @	Ft
Casing-Logger	32 In @ 50	Ft	In @	Ft
Bit Size	17 1/2	In	In	In
Time On Bottom	9:00 AM			
Type Fluid In Hole	Bentonite			
Density	Viscosity			
pH	Fluid Loss	ml	ml	ml
Source of Sample	Tank			
Rm @ Measured Temp.	2.4 @ 75 °F	@ °F	@ °F	@ °F
Rmf @ Measured Temp.	2.1 @ 75 °F	@ °F	@ °F	@ °F
Rmc @ Measured Temp.	@ °F	@ °F	@ °F	@ °F
Source Rmf Rmc	meas			
Rm @ BHT	@ °F	@ °F	@ °F	@ °F
Time Since Circulation	5.0 Hr	Hr	Hr	Hr
Max. Rec. Temp.	N/A °F	°F	°F	°F
Van No. Location	LV-1 Bfld			
Recorded By	Dan Ihde			
Witnessed By	Victor Olveda			



# ELECTRIC LOG

30N

DEPTHS

2 in/100ft

0 64 Inch Normal (ohmmeter<sup>2</sup>/m) x10 1000

0 64 Inch Normal (ohmmeter<sup>2</sup>/m) 100

0 16 Inch Normal (ohmmeter<sup>2</sup>/m) x10 1000

0 16 Inch Normal (ohmmeter<sup>2</sup>/m) 100 0

Single Point (ohms)

20

< - S.P. (10 mV/div) + >

0

50

100

150

200

250

300

350

400

Log Page No. 1

Page Length: 0 - 400 Feet (400 Feet)

Time: 10:51:22 AM

Date: Jun 06, 2012

# ELECTRIC LOG

30N

DEPTHS

2 in/100ft

0 64 Inch Normal (ohmmeter<sup>2</sup>/m) x10 1000

0 64 Inch Normal (ohmmeter<sup>2</sup>/m) 100

0 16 Inch Normal (ohmmeter<sup>2</sup>/m) x10 1000

0 16 Inch Normal (ohmmeter<sup>2</sup>/m) 100

Single Point (ohms)

20

< - S.P. (10 mV/div) + >

400

450

500

550

600

650

700

750

800

Page Length: 400 - 800 Feet (400 Feet)

Time: 10:51:22 AM

Date: Jun 06, 2012



21S/23E 33P

5201 Woodmere Drive, Bakersfield, CA 93313-- www.welenco.com--(800) 445-9914 California Contractor's License No. 722373				
<b>ELECTRIC LOG</b>				
FILING NO.	COMPANY _____ WELL _____ FIELD <u>Corcoran</u> STATE <u>California</u> COUNTY <u>Tulare</u> LOCATION: <u>Approx. 2 Mi. East of Hwy 43 on the North Side of Ave. 144</u>			
JOB NO. 16475	OTHER SERVICES: <u>None</u>  SEC: <u>33</u> TWP: <u>21S</u> RGE: <u>23E</u> LAT.: <u>36° 3' 6.4"</u> LONG.: <u>119° 29' 16.8"</u> MERIDIAN.: <u>Mt. Diablo</u>			
Permanent Datum: <u>Ground Level</u> , Elev. _____ Ft. Elev.: K.B. _____ Ft. Log Measured From: <u>Ground Level</u> , <u>0</u> Ft. Above Perm. Datum D.F. _____ Ft. Drilling Measured From: <u>Ground Level</u> G.L. _____ Ft.				
Run	One			
Date	Jul. 25, 2012			
Depth-Driller		Ft	Ft	Ft
Depth-Logger		Ft	Ft	Ft
Top Logged Interval	0	Ft	Ft	Ft
Btm. Logged Interval		Ft	Ft	Ft
Casing-Driller	32 In @ 50	Ft	In @	Ft
Casing-Logger	32 In @ 50	Ft	In @	Ft
Bit Size	17.5	In	In	In
Time On Bottom	22:10			
Type Fluid In Hole	Polymer			
Density	Viscosity			
pH	Fluid Loss		ml	ml
Source of Sample	Pit			
Rm @ Measured Temp.	8.9 @ 75	°F	@	°F
Rmf @ Measured Temp.	8.9 @ 75	°F	@	°F
Rmc @ Measured Temp.	@	°F	@	°F
Source Rmf	Meas			
Rmc	Meas			
Rm @ BHT	@	°F	@	°F
Time Since Circulation	3.5	Hr	Hr	Hr
Max. Rec. Temp.		°F	°F	°F
Van No.	Location	L-23	Bfld	
Recorded By	Craig Corbell			
Witnessed By	Lenny Godwin			

# ELECTRIC LOG

33P

DEPTHS

2 in/100ft

0 64 Inch Normal (ohmmeter<sup>2</sup>/m) x10 1000

0 64 Inch Normal (ohmmeter<sup>2</sup>/m) 100

0 16 Inch Normal (ohmmeter<sup>2</sup>/m) x10 1000

0 16 Inch Normal (ohmmeter<sup>2</sup>/m) 100 5

Single Point (ohms)

25

< - S.P. (20 mV/div) + >

0

50

100

150

200

250

300

350

400



33P

ELECTRIC LOG

DEPTHS

2 in/100ft

0 64 Inch Normal (ohmmeter<sup>2</sup>/m) x10 1000  
0 64 Inch Normal (ohmmeter<sup>2</sup>/m) 100  
0 16 Inch Normal (ohmmeter<sup>2</sup>/m) x10 1000

0 16 Inch Normal (ohmmeter<sup>2</sup>/m) 100 5 Single Point (ohms) 25

< - S.P. (20 mV/div) + >

400

450

500

550

600

650

700

750

800

215/22E 26N

5201 Woodmere Drive, Bakersfield, CA 93313-- www.welenco.com--(800) 445-9914 California Contractor's License No. 722373					
<b>ELECTRIC - TEMPERATURE LOG</b>					
FILING NO.	COMPANY _____ WELL _____ FIELD <u>Corcoran</u> STATE <u>California</u> COUNTY <u>Kings</u> LOCATION: <u>North side of Paris Ave., .3 Miles East of 6th Ave., across from Boswell yard.</u>				
JOB NO. <b>17054</b>	OTHER SERVICES: <b>None</b>				
SEC: <u>26</u> TWP: <u>21S</u> RGE: <u>22E</u> LAT.: <u>36° 3' 56.8"</u> LONG.: <u>119° 33' 58.2"</u> MERIDIAN.: <u>Mt. Diablo</u>					
Permanent Datum: <u>Ground Level</u> , Elev. <u>190</u> Ft. Elev.: K.B. _____ Ft. Log Measured From: <u>Ground Level</u> , <u>0</u> Ft. Above Perm. Datum D.F. _____ Ft. Drilling Measured From: <u>Ground Level</u> G.L. <u>190</u> Ft.					
Run	One				
Date	Mar. 08, 2013				
Depth-Driller		Ft	Ft	Ft	Ft
Depth-Logger		Ft	Ft	Ft	Ft
Top Logged Interval	0	Ft	Ft	Ft	Ft
Btm. Logged Interval		Ft	Ft	Ft	Ft
Casing-Driller	32 In @ 69	Ft	In @	Ft	In @
Casing-Logger	32 In @ 69	Ft	In @	Ft	In @
Bit Size	17 1/2	In	In	In	In
Time On Bottom	4:15 PM				
Type Fluid In Hole	Water				
Density	Viscosity				
pH	Fluid Loss	ml	ml	ml	ml
Source of Sample	Tank				
Rm @ Measured Temp.	5.0 @ 75 °F	@	°F	@	°F
Rmf @ Measured Temp.	5.0 @ 75 °F	@	°F	@	°F
Rmc @ Measured Temp.	@ °F	@	°F	@	°F
Source Rmf	Rmc	meas			
Rm @ BHT	@ °F	@	°F	@	°F
Time Since Circulation	4.0 Hr	Hr	Hr	Hr	Hr
Max. Rec. Temp.	75.8 °F	°F	°F	°F	°F
Van No.	Location	LV-3	Bfld		
Recorded By	Dan Ihde				
Witnessed By	Victor Olveda				



# ELECTRIC - TEMPERATURE LOG

26N

DEPTHS

2 in/100ft

< - S.P. (10 mV/div) + >

0 64 Inch Normal (ohmmeter<sup>2</sup>/m) x10 1000

0 64 Inch Normal (ohmmeter<sup>2</sup>/m) 100

0 16 Inch Normal (ohmmeter<sup>2</sup>/m) x10 1000 5

Single Point (ohms)

25

0 16 Inch Normal (ohmmeter<sup>2</sup>/m) 100 66

Temperature (°F)

76

0

50

100

150

200

250

300

350

400

# ELECTRIC - TEMPERATURE LOG

26N

DEPTHS

2 in/100ft

< - S.P. (10 mV/div) + >

0 64 Inch Normal (ohmmeter<sup>2</sup>/m) x10 1000

0 64 Inch Normal (ohmmeter<sup>2</sup>/m) 100

0 16 Inch Normal (ohmmeter<sup>2</sup>/m) x10 1000

5

Single Point (ohms)

25

0 16 Inch Normal (ohmmeter<sup>2</sup>/m) 100

66

Temperature (°F)

76

400

450

500

550

600

650

700

750

800

Log Page No. 2

Page Length: 400 - 800 Feet (400 Feet)

Time: 05:46:56 PM

Date: Mar 08, 2013



# welenco

5201 Woodmere Drive, Bakersfield, CA 93313-- www.welenco.com--(800) 445-9914  
California Contractor's License No. 722373

## ELECTRIC LOG

FILING NO.

COMPANY \_\_\_\_\_

WELL \_\_\_\_\_

FIELD Corcoran

STATE California COUNTY Kings

LOCATION: .5 mile South of Niles and 12th Ave.

OTHER SERVICES:  
None

JOB NO.  
16805

SEC: 14 TWP: 21S RGE: 21E LAT.: 36° 6' 29.1" LONG.: 119° 40' 47.4" MERIDIAN.: Mt. Diablo

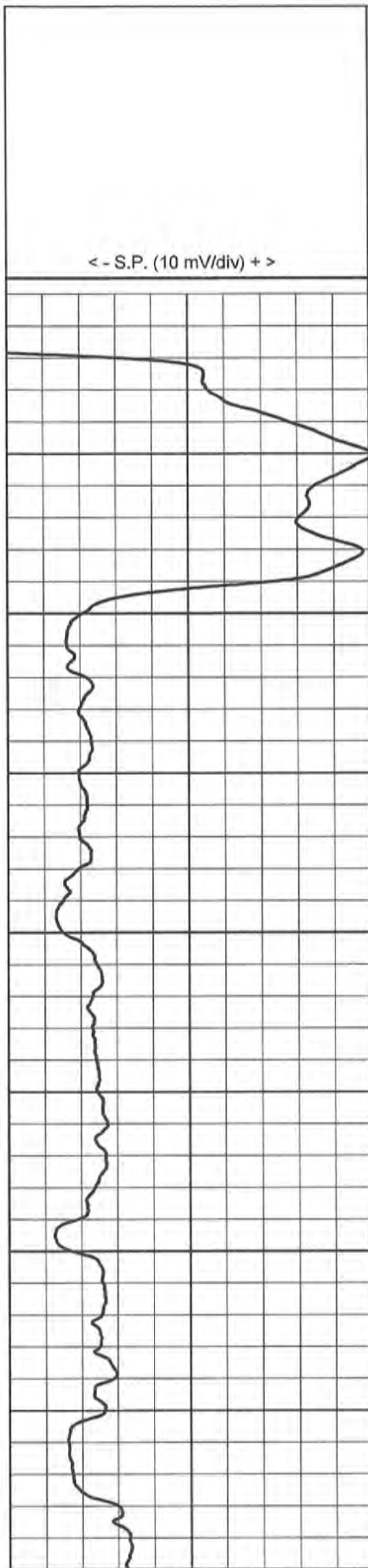
Permanent Datum: Ground Level, Elev. 196 Ft. Elev.: K.B. \_\_\_\_\_ Ft.

Log Measured From: Ground Level, 0 Ft. Above Perm. Datum D.F. \_\_\_\_\_ Ft.

Drilling Measured From: Ground Level G.L. 196 Ft.

Run	One						
Date	Aug. 06, 2013						
Depth-Driller		Ft		Ft		Ft	
Depth-Logger		Ft		Ft		Ft	
Top Logged Interval	0	Ft		Ft		Ft	
Btm. Logged Interval		Ft		Ft		Ft	
Casing-Driller	32	In @ 90	Ft	In @	Ft	In @	Ft
Casing-Logger	32	In @ 91	Ft	In @	Ft	In @	Ft
Bit Size	17.5	In		In		In	
Time On Bottom	6:40 AM						
Type Fluid In Hole	Bentonite						
Density							
Viscosity							
pH							
Fluid Loss			ml		ml		ml
Source of Sample	Tank						
Rm @ Measured Temp.	3.9	@ 75	°F	@	°F	@	°F
Rmf @ Measured Temp.	3.5	@ 75	°F	@	°F	@	°F
Rmc @ Measured Temp.		@	°F	@	°F	@	°F
Source Rmf Rmc	meas						
Rm @ BHT		@	°F	@	°F	@	°F
Time Since Circulation	5.0		Hr		Hr		Hr
Max. Rec. Temp.	N/A		°F		°F		°F
Van No.	Location	LV-3	Bfld				
Recorded By	Dan Ihde						
Witnessed By	Victor Olveda						





Log Page No. 1

DEPTHS

2 in/100ft

0

50

100

150

200

250

300

350

400

ELECTRIC LOG

15A

0 64 Inch Normal (ohmmeter<sup>2</sup>/m) x10 1000

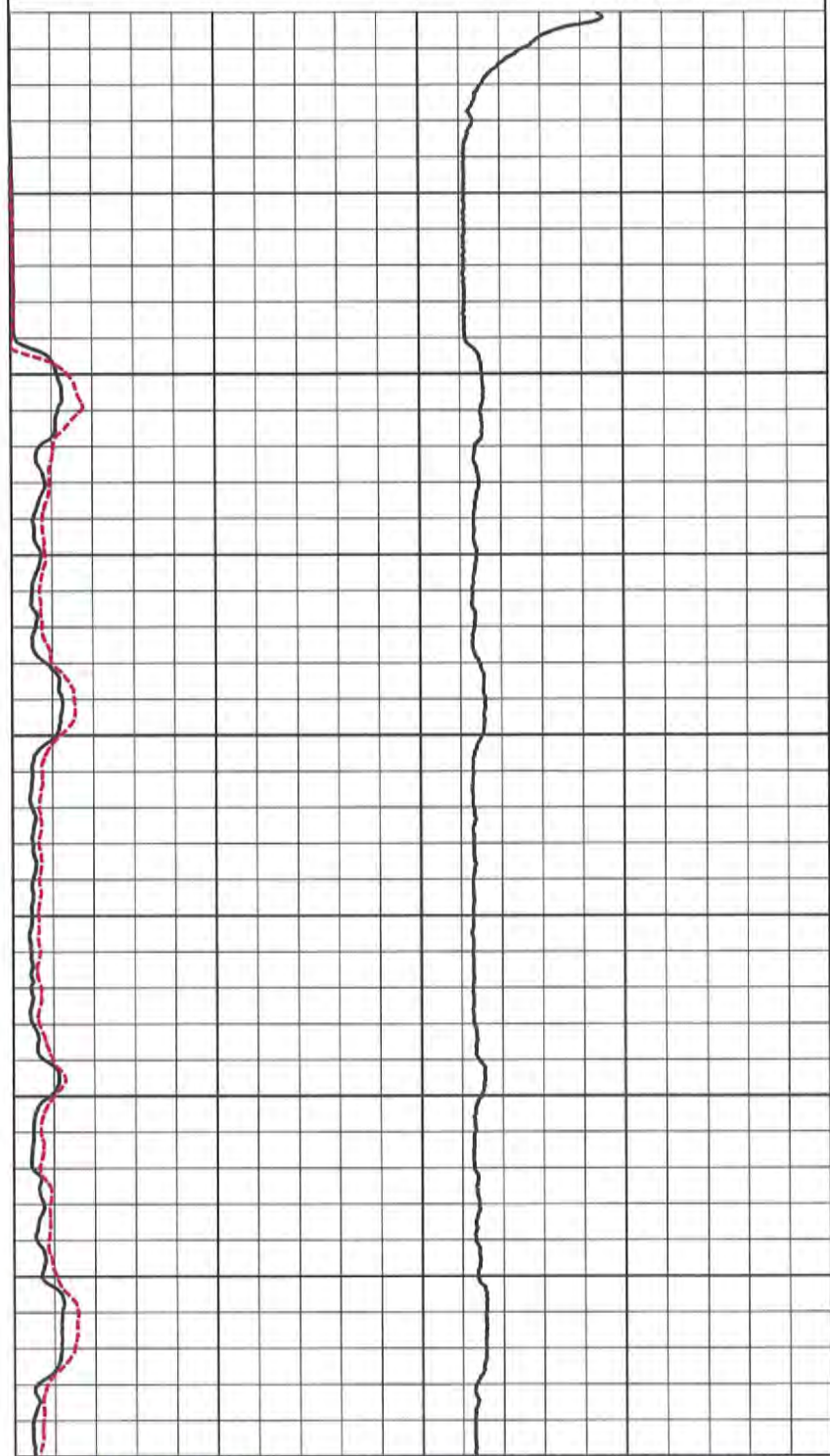
0 64 Inch Normal (ohmmeter<sup>2</sup>/m) 100

0 16 Inch Normal (ohmmeter<sup>2</sup>/m) x10 1000

0 16 Inch Normal (ohmmeter<sup>2</sup>/m) 100

Single Point (ohms)

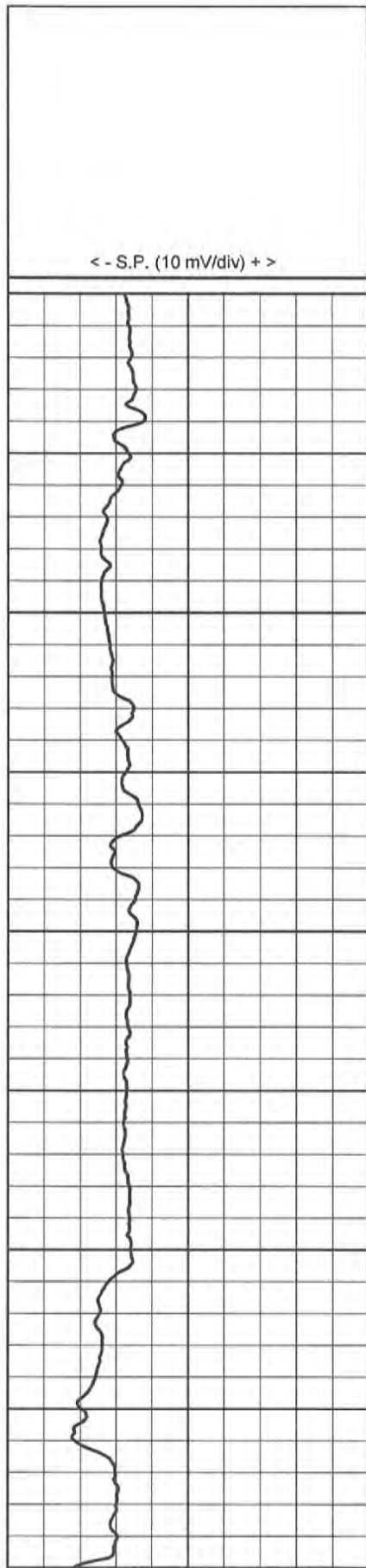
50



Page Length: 0 - 400 Feet (400 Feet)

Time: 08:59:40 AM

Date: Aug 06, 2013



Log Page No. 2

DEPTHS

2 in/100ft

ELECTRIC LOG

15A

0 64 Inch Normal (ohmmeter<sup>2</sup>/m) x10 1000

0 64 Inch Normal (ohmmeter<sup>2</sup>/m) 100

0 16 Inch Normal (ohmmeter<sup>2</sup>/m) x10 1000

0 16 Inch Normal (ohmmeter<sup>2</sup>/m) 100

Single Point (ohms)

50

400

450

500

550

600

650

700

750

800

Page Length: 400 - 800 Feet (400 Feet)

Time: 08:59:41 AM

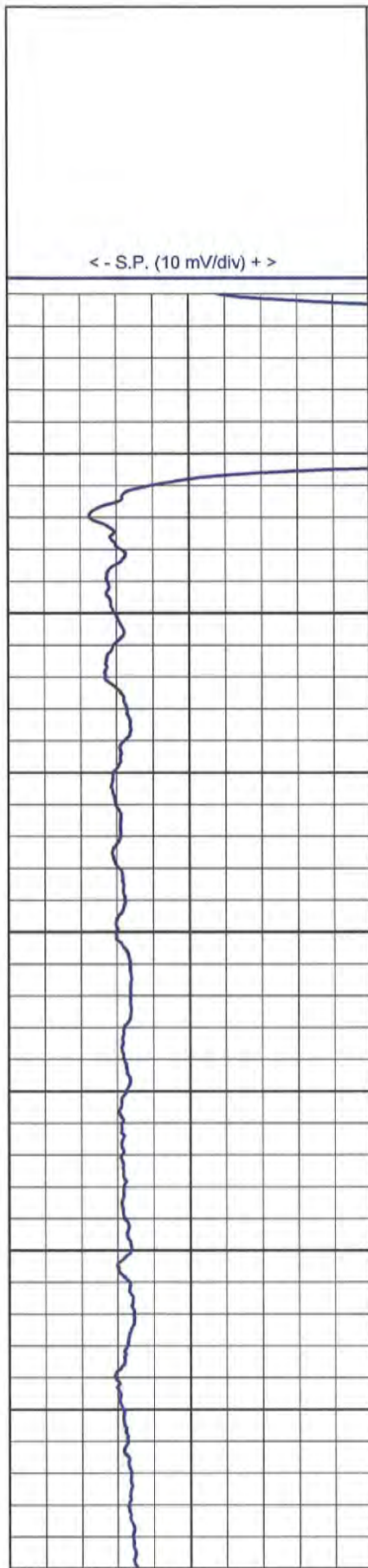
Date: Aug 06, 2013



22S/22E 18D

5201 Woodmere Drive, Bakersfield, CA 93313-- www.welenco.com--(800) 445-9914 California Contractor's License No. 722373	
<b>ELECTRIC LOG</b>	
FILING NO.	COMPANY _____ WELL _____ FIELD <u>Corcoran</u> STATE <u>California</u> COUNTY <u>Kings</u>
JOB NO. <b>17376</b>	LOCATION: <b>SW corner of 10th and Redding Ave.</b>
SEC: <u>18</u> TWP: <u>22S</u> RGE: <u>22E</u> LAT.: <u>36° 01' 16.1"</u> LONG.: <u>119° 38' 33.1"</u> MERIDIAN.: <u>Mt. Diablo</u>	
Permanent Datum: <u>Ground Level</u> , Elev. <u>182</u> Ft. Elev.: K.B. _____ Ft. Log Measured From: <u>Ground Level</u> , <u>0</u> Ft. Above Perm. Datum D.F. _____ Ft. Drilling Measured From: <u>Ground Level</u> G.L. <u>182</u> Ft.	
Run	<u>One</u>
Date	<u>Dec. 04, 2013</u>
Depth-Driller	_____ Ft. _____ Ft. _____ Ft. _____ Ft.
Depth-Logger	_____ Ft. _____ Ft. _____ Ft. _____ Ft.
Top Logged Interval	<u>0</u> Ft. _____ Ft. _____ Ft. _____ Ft.
Btm. Logged Interval	_____ Ft. _____ Ft. _____ Ft. _____ Ft.
Casing-Driller	<u>32</u> In @ <u>50</u> Ft. _____ In @ _____ Ft. _____ In @ _____ Ft. _____ In @ _____ Ft.
Casing-Logger	<u>32</u> In @ <u>54</u> Ft. _____ In @ _____ Ft. _____ In @ _____ Ft. _____ In @ _____ Ft.
Bit Size	<u>17 1/2</u> In _____ In _____ In _____ In
Time On Bottom	<u>1:00 PM</u>
Type Fluid In Hole	<u>Bentonite</u>
Density	_____
Viscosity	_____
pH	_____
Fluid Loss	_____ ml _____ ml _____ ml _____ ml
Source of Sample	<u>Tank</u>
Rm @ Measured Temp.	<u>3.1</u> @ <u>75</u> °F _____ @ _____ °F _____ @ _____ °F _____ @ _____ °F
Rmf @ Measured Temp.	<u>2.8</u> @ <u>75</u> °F _____ @ _____ °F _____ @ _____ °F _____ @ _____ °F
Rmc @ Measured Temp.	_____ @ _____ °F _____ @ _____ °F _____ @ _____ °F _____ @ _____ °F
Source Rmf	<u>meas</u>
Rmc	_____
Rm @ BHT	_____ @ _____ °F _____ @ _____ °F _____ @ _____ °F _____ @ _____ °F
Time Since Circulation	<u>4.0</u> Hr _____ Hr _____ Hr _____ Hr
Max. Rec. Temp.	<u>N/A</u> °F _____ °F _____ °F _____ °F
Van No.	<u>LV-3</u>
Location	<u>Bfld</u>
Recorded By	<u>Dan Ihde</u>
Witnessed By	<u>Victor Olveda</u>





Log Page No. 1

DEPTHS

2 in/100ft

0

50

100

150

200

250

300

350

400

ELECTRIC LOG

18D

0 64 Inch Normal (ohmmeter<sup>2</sup>/m) 100

0 16 Inch Normal (ohmmeter<sup>2</sup>/m) 100

0

Single Point (ohms)

50

Page Length: 0 - 400 Feet (400 Feet)

Time: 02:43:14 PM

Date: Dec 04, 2013

18D

ELECTRIC LOG

DEPTHS

2 in/100ft

< - S.P. (10 mV/div) + >

0 64 Inch Normal (ohmmeter<sup>2</sup>/m) 100

0 16 Inch Normal (ohmmeter<sup>2</sup>/m) 100

Single Point (ohms)

50

400

450

500

550

600

650

700

750

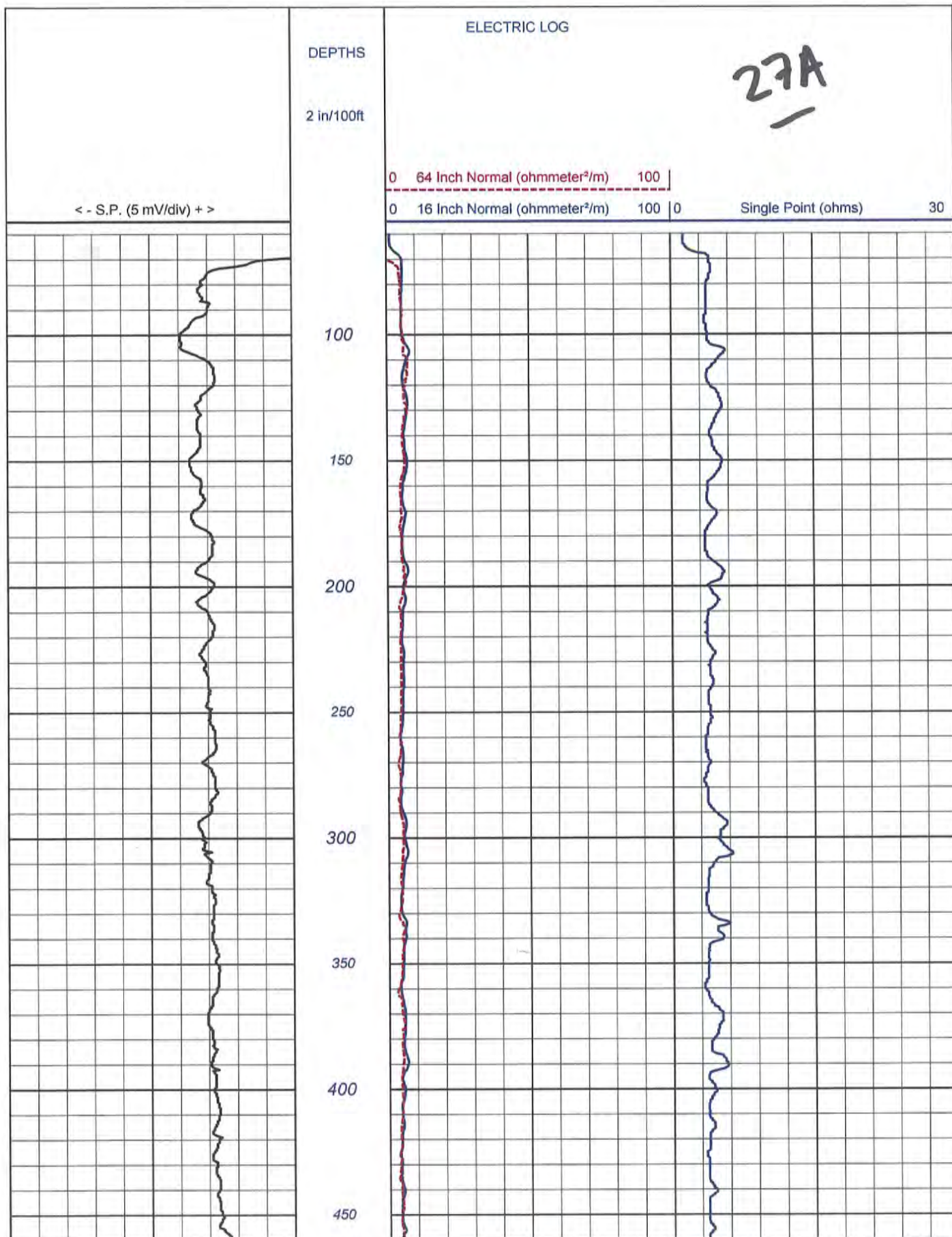
800

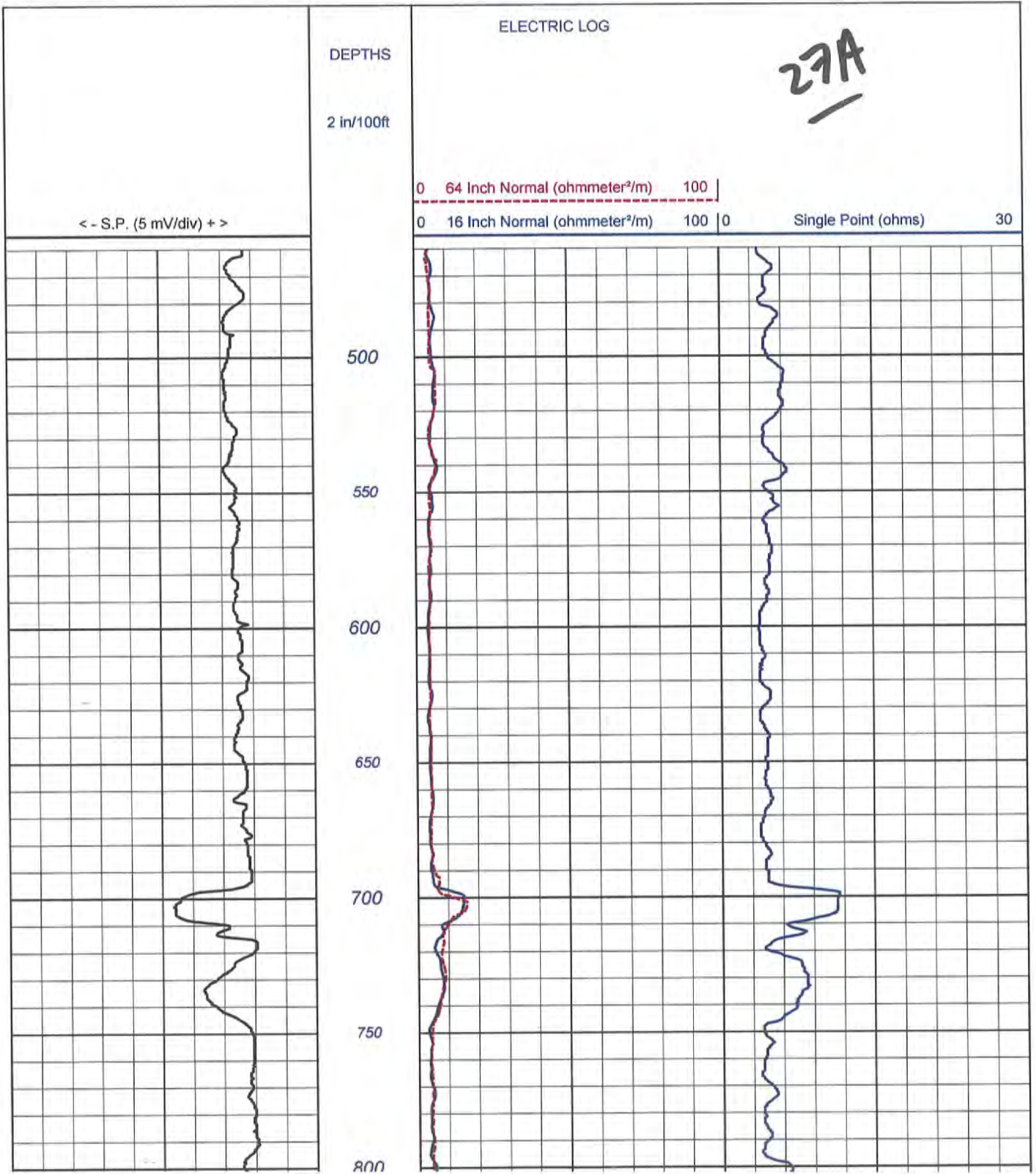


215/21E 27A

5201 Woodmere Drive, Bakersfield, CA 93313-- www.welenco.com--(800) 445-9914 California Contractor's License No. 722373			
ELECTRIC LOG			
FILING NO.  Job# 27301	COMPANY _____ WELL _____ FIELD <u>Stratford</u> STATE <u>California</u> COUNTY <u>Kings</u> LOCATION: <u>3 Miles West of Avenue 10 on the South side of Pueblo.</u>		
JOB NO. 17618	OTHER SERVICES: <u>None</u>		
SEC: _____ TWP: _____ RGE: _____ LAT.: _____ LONG.: _____ MERIDIAN.: _____			
Permanent Datum: <u>Ground Level</u> , Elev. _____ Ft. Elev.: K.B. _____ Ft. Log Measured From: <u>Ground Level</u> , <u>0</u> Ft. Above Perm. Datum D.F. _____ Ft. Drilling Measured From: <u>Ground Level</u> G.L. _____ Ft.			
Run	One		
Date	Jan. 20, 2014		
Depth-Driller		Ft	Ft
Depth-Logger		Ft	Ft
Top Logged Interval	60	Ft	Ft
Btm. Logged Interval		Ft	Ft
Casing-Driller	32 In @ 67	Ft	In @ Ft
Casing-Logger	In @ 67	Ft	In @ Ft
Bit Size	17.5	In	In
Time On Bottom	15:54		
Type Fluid In Hole	Water		
Density	Viscosity	N/A	N/A
pH	Fluid Loss	N/A	N/A ml
Source of Sample	Pit		
Rm @ Measured Temp.	3.6 @ 75 °F	@ °F	@ °F
Rmf @ Measured Temp.	3.6 @ 75 °F	@ °F	@ °F
Rmc @ Measured Temp.	N/A @ -- °F	@ °F	@ °F
Source Rmf	Rmc	Meas	N/A
Rm @ BHT	N/A @ -- °F	@ °F	@ °F
Time Since Circulation	4.0 Hr	Hr	Hr
Max. Rec. Temp.	N/A °F	°F	°F
Van No.	Location	L-15	Bfld
Recorded By	David Jackson		
Witnessed By	Victor Olveda		









# PACIFIC SURVEYS

## ELECTRIC LOG GAMMA RAY

225/22E 18N

Job No.

18120

Company

Well

File No.

Field KETTLEMAN CITY

County KERN State CA

Location:

1 MILE SOUTH OF THE INTERSECTION OF REDDING AVE & 10TH AVE.  
GPS: N36000.424' W119038.567'

Other Services:

Sec.

Twp.

Rge.

Permanent Datum  
Log Measured From  
Drilling Measured From

G.L.  
G.L.  
G.L.

0'

Elevation  
above perm. datum

Elevation

K.B.  
D.F.  
G.L.

Date

03/12/2014

Run Number

ONE

Depth Driller

Bottom Logged Interval

Top Log Interval

Casing Driller

32" @ 52'

Casing Logger

52'

Bit Size

17.5"

Type Fluid in Hole

BENTONITE

Density / Viscosity

N/A

pH / Fluid Loss

N/A

Source of Sample

TANK

Rm @ Meas. Temp

9.48 @ 69.1 F

Rmf @ Meas. Temp

9.39 @ 69.1 F

Rmc @ Meas. Temp

N/A

Source of Rmf / Rmc

MEASURE

Rm @ BHT

N/A

Time Circulation Stopped

8 HOURS

Time Logger on Bottom

3:30 PM

Max. Recorded Temperature

N/A

Equipment Number

PS-7

Location

L.A.

Recorded By

ABREAU

Witnessed By

---

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All interpretations are opinions based on inferences from electrical or other measurements and we cannot and do not guarantee the accuracy or correctness of any interpretation, and we shall not, except in the case of gross or willful negligence on our part, be liable or responsible for any loss, costs, damages, or expenses incurred or sustained by anyone resulting from any interpretation made by any of our officers, agents or employees. These interpretations are also subject to our general terms and conditions set out in our current Price Schedule.

Comments

### Calibration Report

Database File 18120.db  
Dataset Pathname elog  
Dataset Creation Wed Mar 12 15:41:32 2014

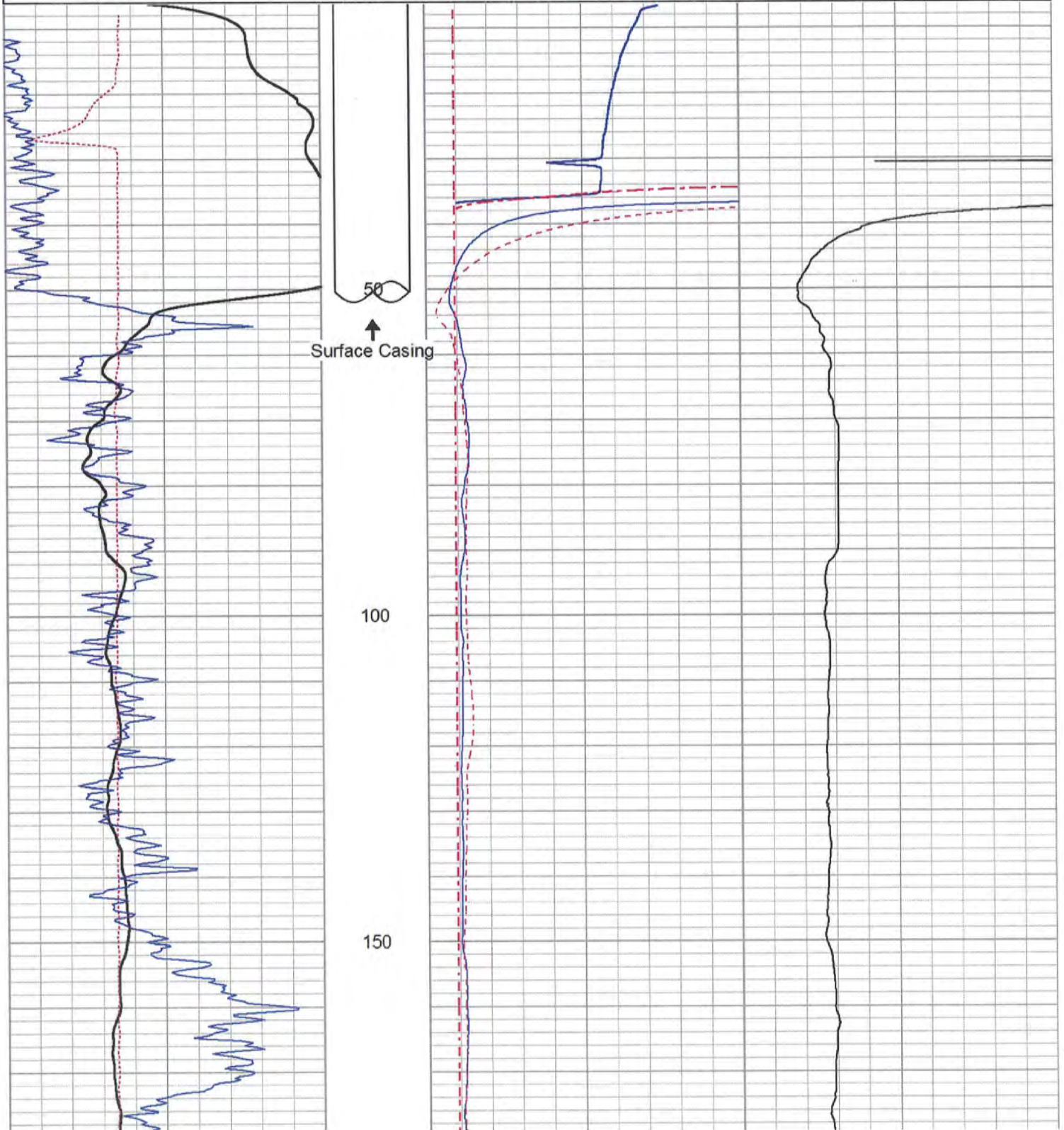
ELOG Calibration Report



Database File 18120.db  
 Dataset Pathname elog  
 Presentation Format elog  
 Dataset Creation Wed Mar 12 15:41:32 2014  
 Charted by Depth in Feet scaled 1:240

18N

-70	SP (mV)	30	0	RSN (Ohm-m)	100	0	SPR (Ohm-m)	25
0	Line Speed (ft/min)	-100	0	RLN (Ohm-m)	100			
20	Gamma-Ray (GAPI)	80	0	RMF (Ohm-m)	100			
			100	RSN x 10 (Ohm-m)	1000			
			100	RLN x 10 (Ohm-m)	1000			





200

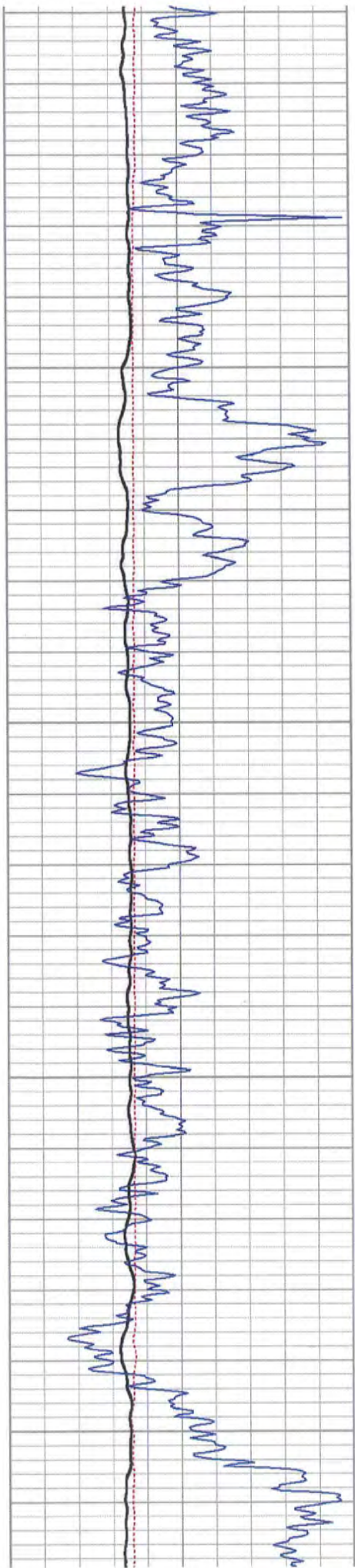
250

300

350

18N





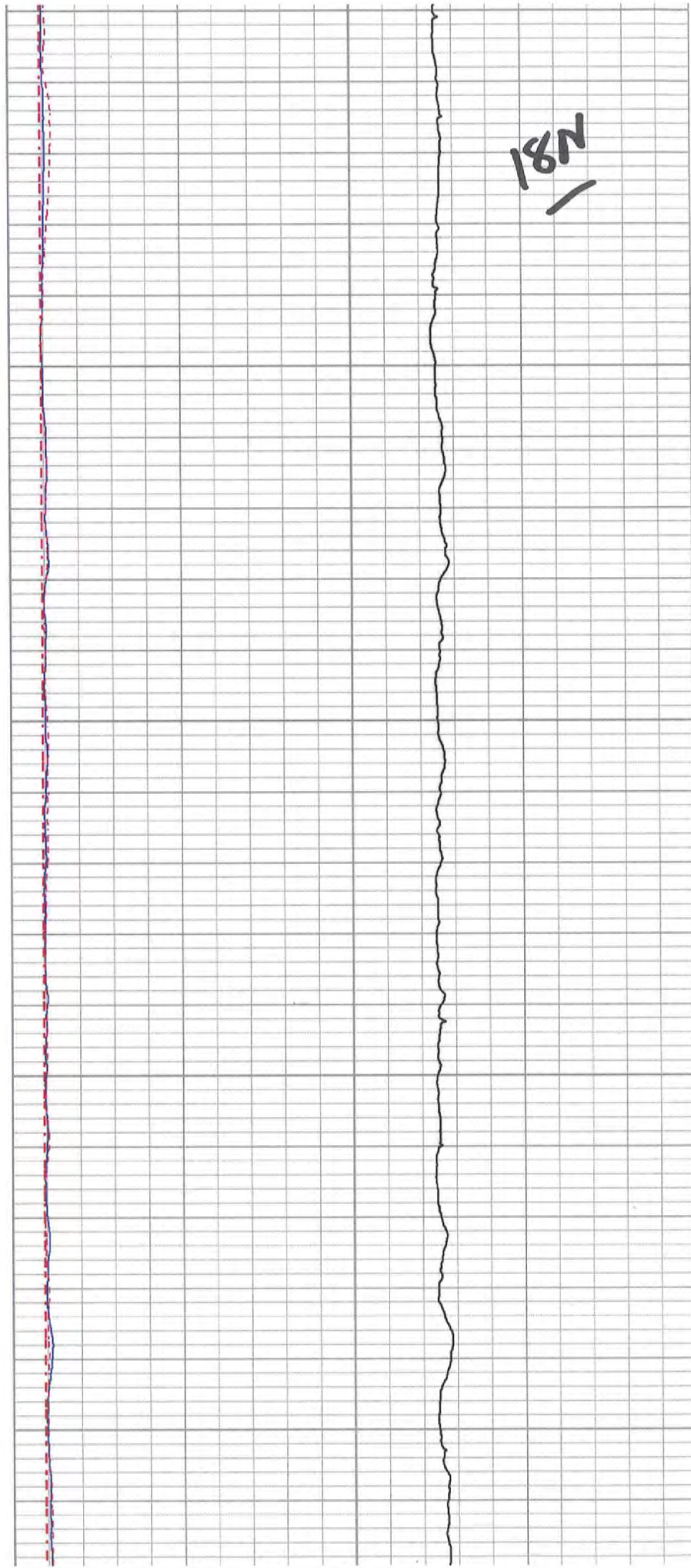
400

450

500

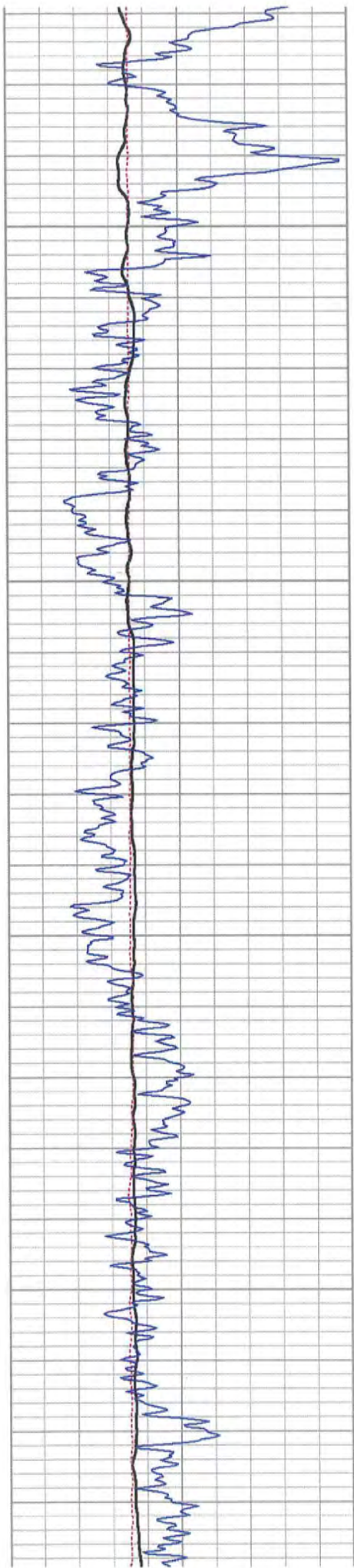
550

600



18N



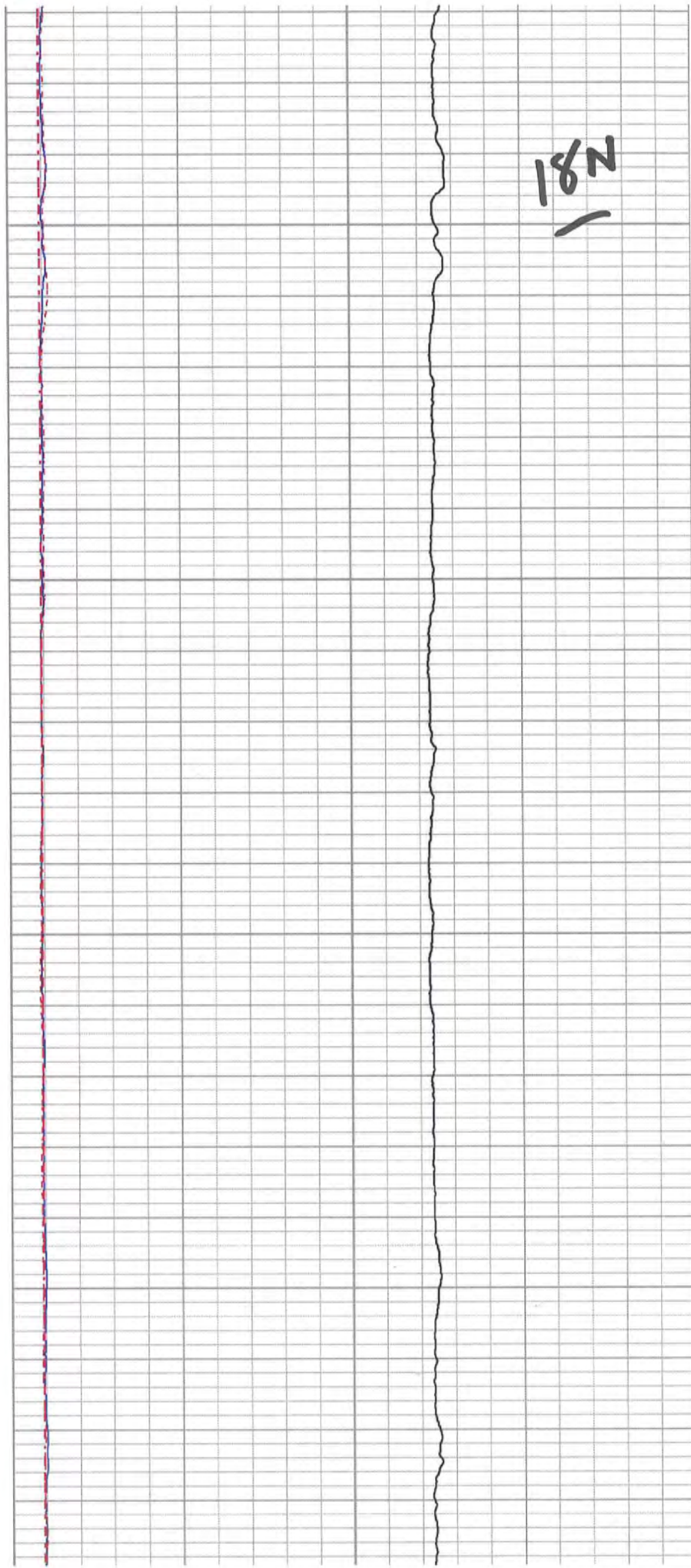


650

700

750

800



182  
/

215/216 270

PACIFIC  
SURVEYS

# ELECTRIC LOG GAMMA RAY

Job No. 18206	Company Well Field County KINGS		State CA
File No.	CORCORAN		Other Services: NONE
Location: SOUTH SIDE OF PUEBLO AVE 3 MILES WEST OF 10TH AVE GPS: N360 4.762' W1190 41.845'			
Sec.	Twp.	Rge.	
Permanent Datum Log Measured From Drilling Measured From	G.L. G.L. G.L.	Elevation above perm. datum	Elevation K.B. D.F. G.L.
Date	04-16-2014		
Run Number	ONE		
Depth Driller			
Depth Logger			
Bottom Logged Interval			
Top Log Interval	25'		
Casing Driller	32" @ 54'		
Casing Logger	54'		
Bit Size	17 1/2"		
Type Fluid in Hole	QUICK GEL		
Density / Viscosity	N/A		
pH / Fluid Loss	N/A		
Source of Sample	TANK		
Rim @ Meas. Temp	4.9 @ 67F		
Rmt @ Meas. Temp	4.64 @ 67F		
Rmc @ Meas. Temp	N/A		
Source of Rmt / Rmc	MEAS		
Rm @ BHT	N/A		
Time Circulation Stopped	17:00		
Time Logger on Bottom	21:45		
Max. Recorded Temperature	N/A		
Equipment Number	PS-5		
Location	BFL		
Recorded By	IHDE		
Witnessed By	---		

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## Comments

## Calibration Report

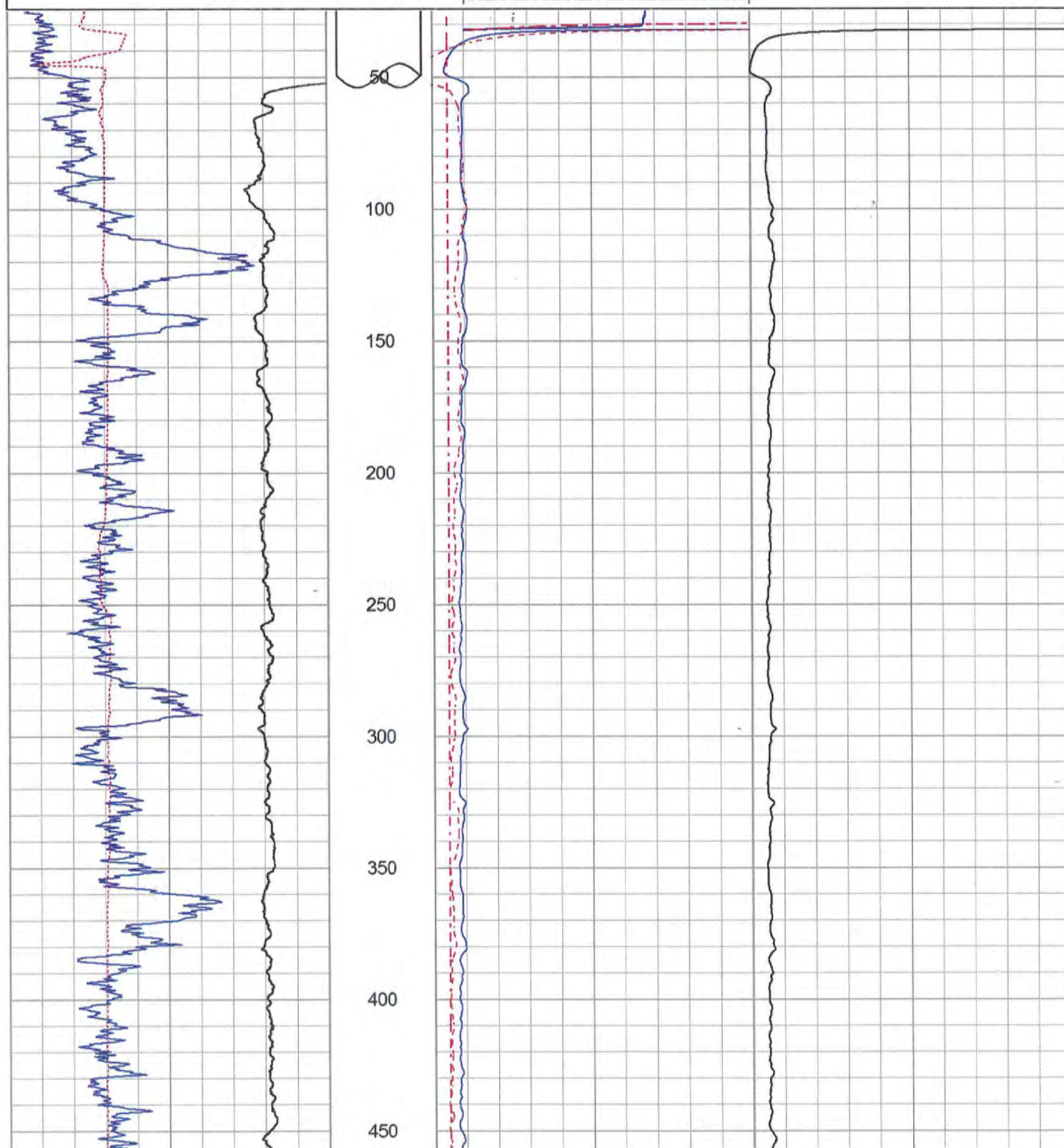
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Dataset Pathname elog  
Dataset Creation Wed Apr 16 21:47:51 2014



Database File 18206.db  
 Dataset Pathname elog  
 Presentation Format elog  
 Dataset Creation Wed Apr 16 21:47:51 2014  
 Charted by Depth in Feet scaled 1:600

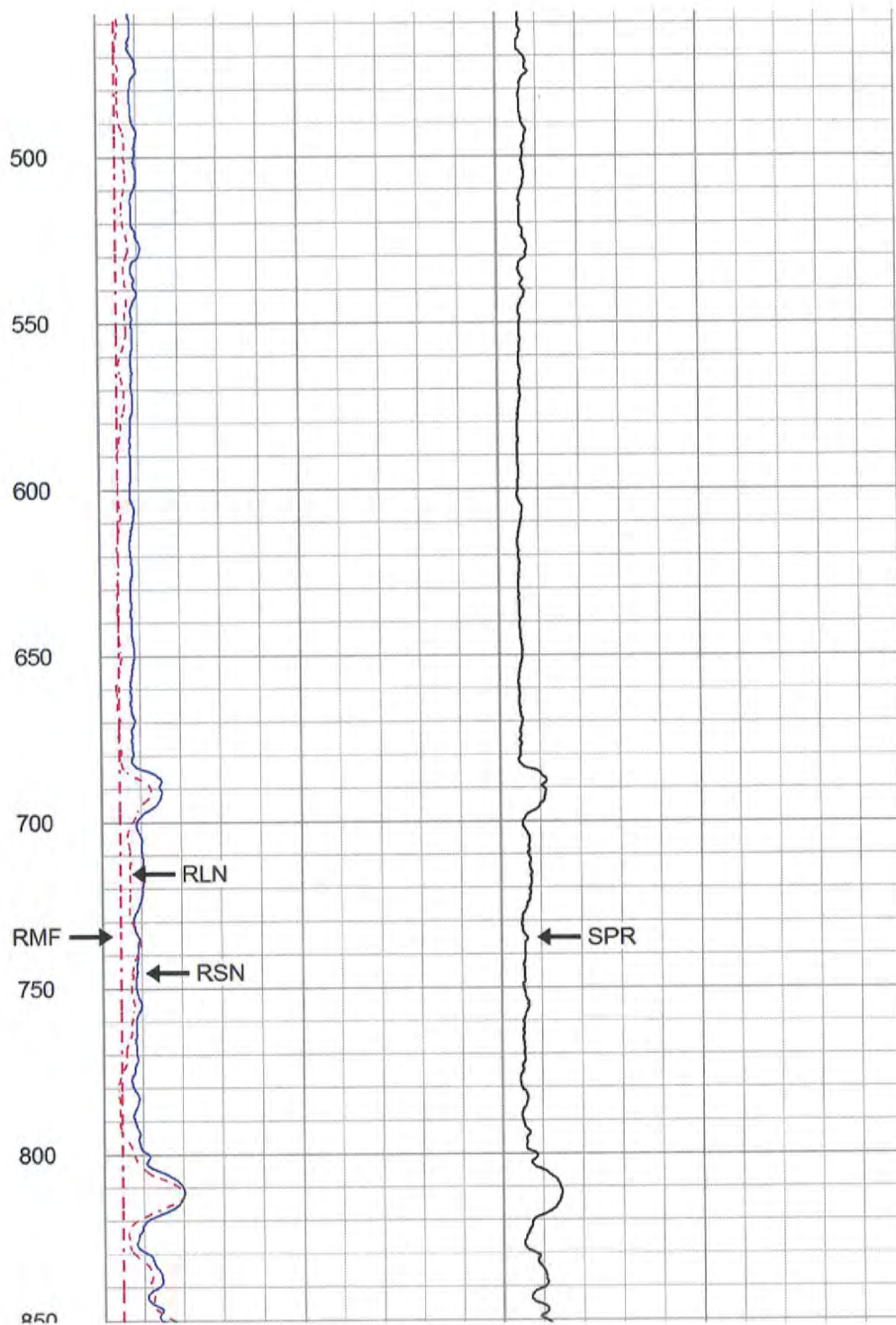
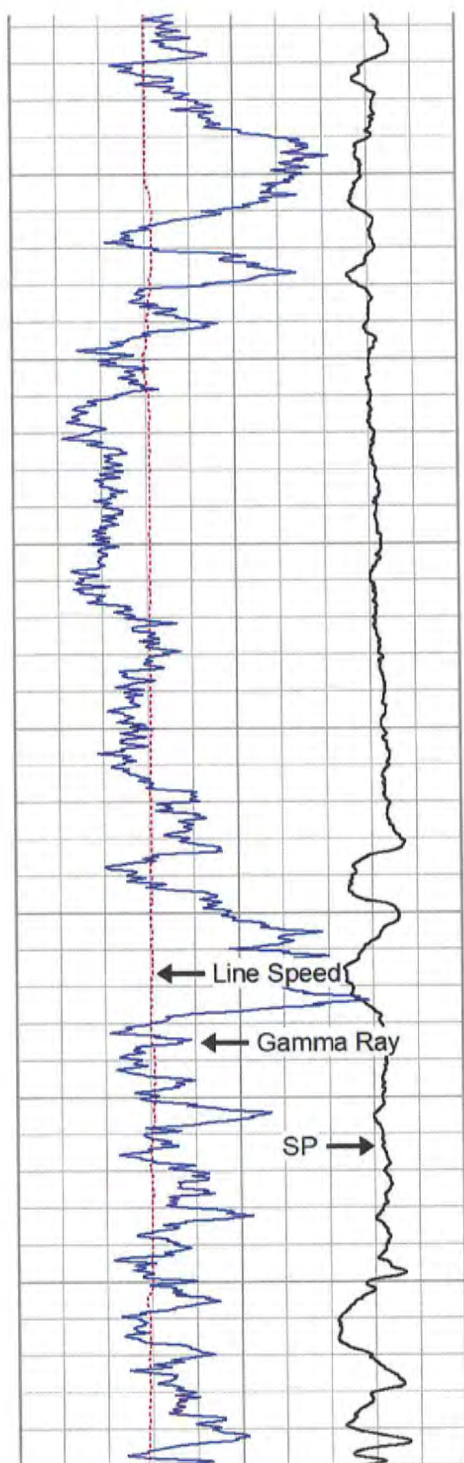
27D

-40	SP (mV)	10	0	RSN (Ohm-m)	100	0	SPR (Ohm-m)	100
0	Line Speed (ft/min)	100	0	RLN (Ohm-m)	100			
25	Gamma-Ray (GAPI)	175	0	RMF (Ohm-m)	100			
			100	RSN x 10 (Ohm-m)	1000			
			100	RLN x 10 (Ohm-m)	1000			





27D



215/216 280

PACIFIC  
SURVEYS

ELECTRIC LOG  
GAMMA RAY

Job No. 18395	Company Well Field County	CORCORAN KINGS	State CA
File No.	Other Services:		
Location: SOUTH SIDE OF PUEBLO AVE 4 MILES WEST OF 10TH AVE GPS: N360 4.763' W1190 42.919'			
Sec.	Twp.	Rge.	
Permanent Datum Log Measured From Drilling Measured From	G.L. G.L. G.L.	Elevation above perm. datum	Elevation K.B. D.B. G.L.
Date	06-07-2014		
Run Number	ONE		
Depth Driller			
Depth Logger			
Bottom Logged Interval			
Top Log Interval	25'		
Casing Driller	32" @ 54'		
Casing Logger	54'		
Bit Size	17 1/2"		
Type Fluid In Hole	QUICK GEL		
Density / Viscosity	N/A		
pH / Fluid Loss	N/A		
Source of Sample	TANK		
Rm @ Meas. Temp	8.63 @ 80.9F		
Rmf @ Meas. Temp	8.49 @ 80.9F		
Rmc @ Meas. Temp	N/A		
Source of Rmf / Rmc	MEAS		
Rm @ BHT	N/A		
Time Circulation Stopped	3:00 AM		
Time Logger on Bottom	9:15 AM		
Max. Recorded Temperature	N/A		
Equipment Number	PS-5		
Location	BFL		
Recorded By	ABREAU		
Witnessed By			

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All interpretations are opinions based on inferences from electrical or other measurements and we cannot and do not guarantee the accuracy or correctness of any interpretation, and we shall not, except in the case of gross or willful negligence on our part, be liable or responsible for any loss, costs, damages, or expenses incurred or sustained by anyone resulting from any interpretation made by any of our officers, agents or employees. These interpretations are also subject to our general terms and conditions set out in our current Price Schedule.

Comments

Calibration Report

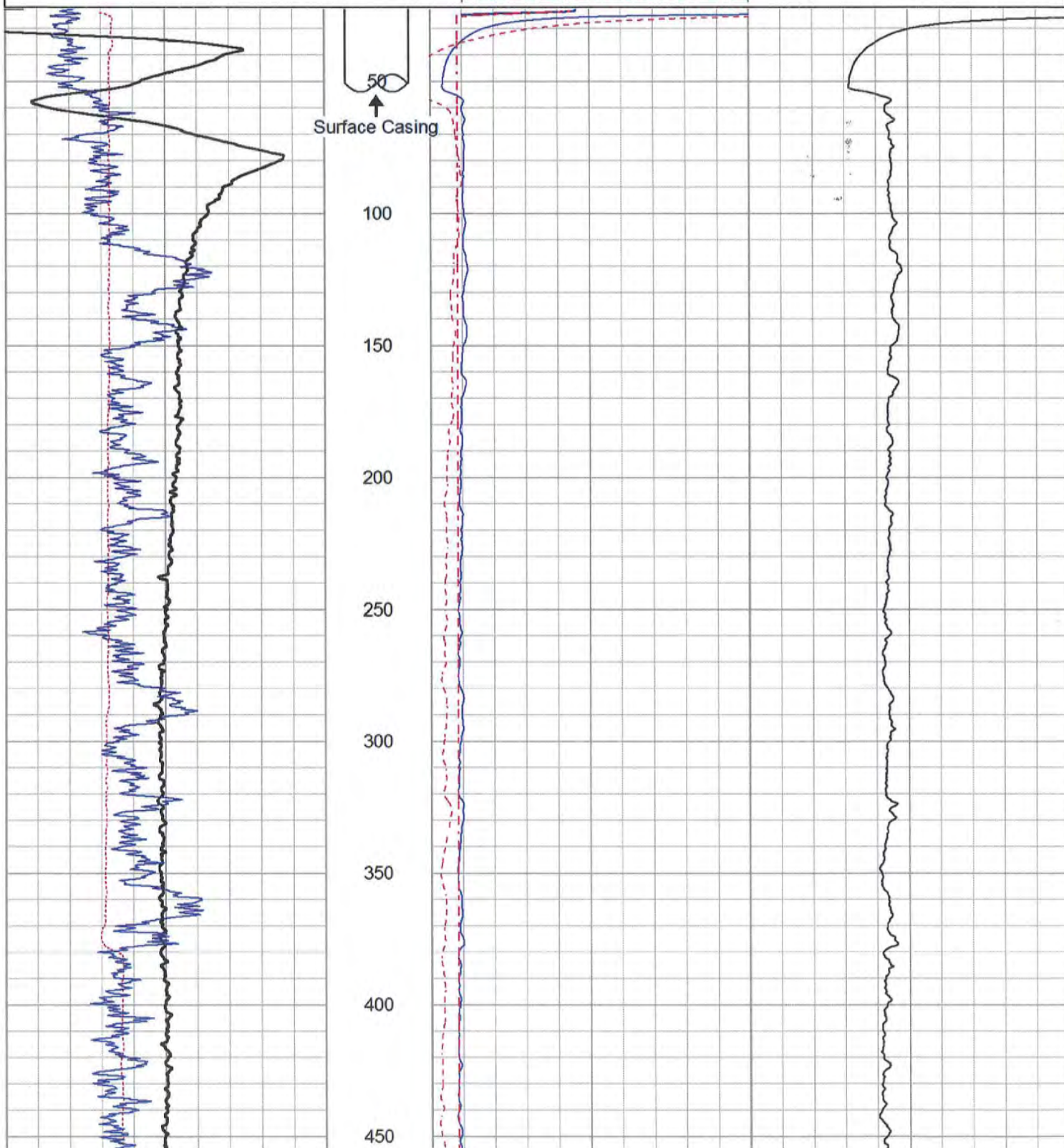
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Dataset Pathname elog  
Dataset Creation Sat Jun 07 09:14:08 2014



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 Presentation Format elog  
 Dataset Creation Sat Jun 07 12:06:02 2014  
 Charted by Depth in Feet scaled 1:600

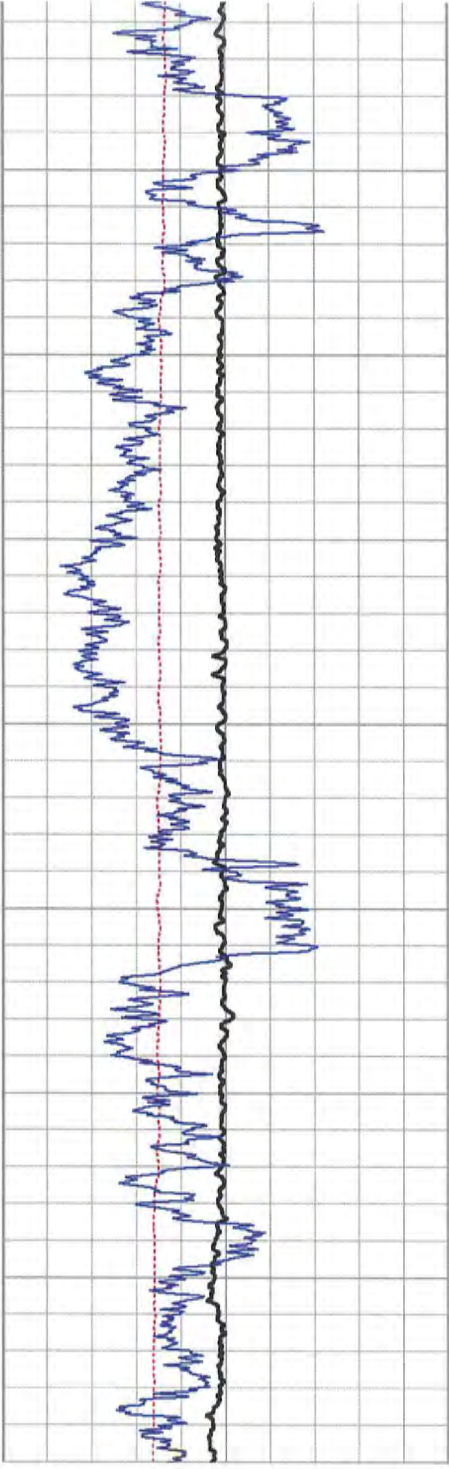
28D

0	SP (mV)	20	0	RSN (Ohm-m)	100	0	SPR (Ohm-m)	25
0	Line Speed (ft/min)	100	0	RLN (Ohm-m)	100			
10	Gamma-Ray (GAPI)	110	0	RMF (Ohm-m)	100			
			100	RSN x 10 (Ohm-m)	1000			
			100	RLN x 10 (Ohm-m)	1000			





28D



500  
550  
600  
650  
700  
750  
800  
850



## ELECTRIC LOG GAMMA-RAY

215/215 290

Job No. 18567	Company Well	Field CORCORAN	County KINGS	State CA
File No.	Location: ON SOUTH SIDE OF PUEBLO AVE. 5 MILES WEST OF 10TH AVE GPS: N 360 4.751' W 1170 43.970'			
Sec.		Twp.	Rge.	Other Services: NONE
Permanent Datum Log Measured From Drilling Measured From	G.L. G.L. G.L.	0'	Elevation above perm. datum	K.B. D.F. G.L.
Date	07-26-2014			
Run Number	ONE			
Depth Driller				
Depth Logger				
Bottom Logged Interval	25'			
Top Log Interval	32' @ 72'			
Casing Driller	72'			
Casing Logger	17.5"			
Bit Size	BENTONITE			
Type Fluid In Hole	N/A			
Density / Viscosity	N/A			
pH / Fluid Loss	TANK			
Source of Sample	2.61 @ 88.6F			
Rm @ Meas. Temp	2.32 @ 88.6F			
Rmf @ Meas. Temp	N/A			
Rmc @ Meas. Temp	MEASURE			
Source of Rmf / Rmc	N/A			
Rm @ BHT	0700			
Time Circulation Stopped	1345			
Time Logger on Bottom	N/A			
Max. Recorded Temperature	PS-7			
Equipment Number	LA			
Location	SCHUMACHER			
Recorded By	--			
Witnessed By				

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All interpretations are opinions based on inferences from electrical or other measurements and we cannot and do not guarantee the accuracy or correctness of any interpretation, and we shall not, except in the case of gross or willful negligence on our part, be liable or responsible for any loss, costs, damages, or expenses incurred or sustained by anyone resulting from any interpretation made by any of our officers, agents or employees. These interpretations are also subject to our general terms and conditions set out in our current Price Schedule.

### Comments

### Calibration Report

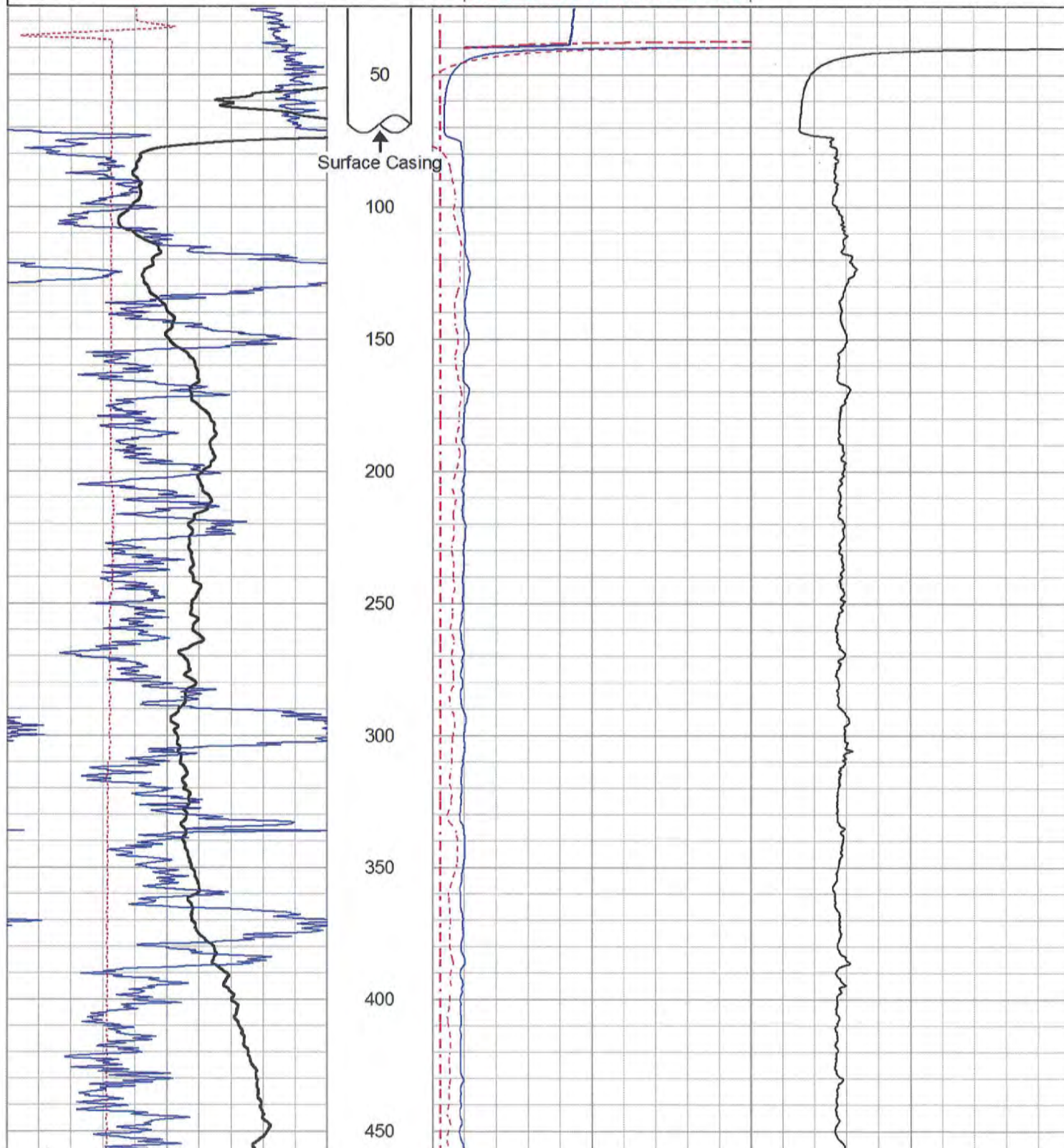
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Dataset Pathname elog  
Dataset Creation Sat Jul 26 14:03:52 2014



Database File 18567.db  
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 Presentation Format elog  
 Dataset Creation Sat Jul 26 14:03:52 2014  
 Charted by Depth in Feet scaled 1:600

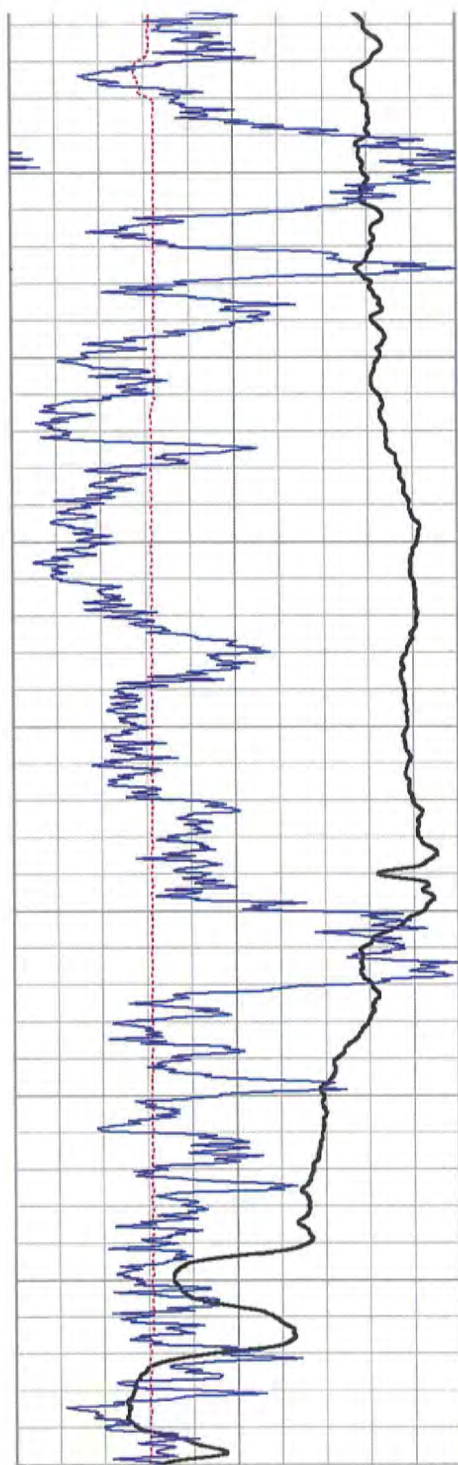
290

-110	SP (mV)	-60	0	RSN (Ohm-m)	100	0	SPR (Ohm-m)	25
0	Line Speed (ft/min)	-100	0	RLN (Ohm-m)	100			
50	Gamma-Ray (GAPI)	150	0	RMF (Ohm-m)	100			
			100	RSN x 10 (Ohm-m)	1000			
			100	RLN x 10 (Ohm-m)	1000			





29 D



500

550

600

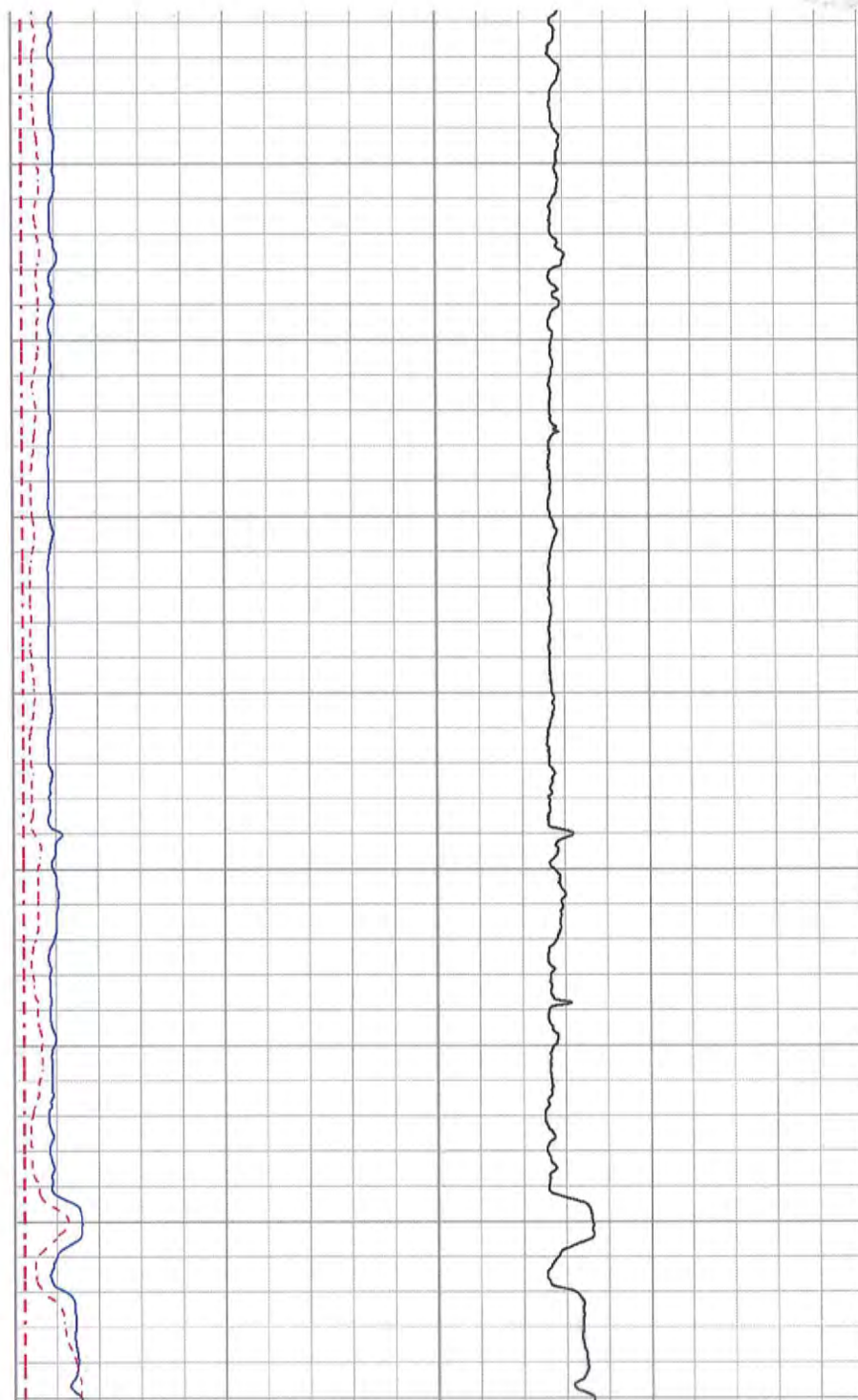
650

700

750

800

850



# PACIFIC SURVEYS

## ELECTRIC LOG GAMMA-RAY

215/21E 300

Job No. 18745	Company Well	Field CORCORAN	County KINGS	State CA	Other Services:
File No.					
Location: ON SOUTH SIDE OF PUEBLO AVE. 6 MILES WEST OF 10TH AVE. GPS: N 360 04.765' W 119 43.970'					
Sec.	Twp.	Rge.			
Permanent Datum Log Measured From Drilling Measured From	G.L. G.L. G.L.	0'	Elevation above perm. datum	K.B. D.F. G.L.	Elevation
Date	09-21-2014				
Run Number	ONE				
Depth Driller					
Depth Logger					
Bottom Logged Interval					
Top Log Interval	25'				
Casing Driller	32 @ 72'				
Casing Logger	72'				
Bit Size	17.5"				
Type Fluid In Hole	BENTONITE				
Density / Viscosity	N/A				
pH / Fluid Loss	N/A				
Source of Sample	TANK				
Rm @ Meas. Temp	2.40 @ 77F				
Rmf @ Meas. Temp	2.16 @ 77F				
Rmc @ Meas. Temp	N/A				
Source of Rmf / Rmc	MEASURE				
Rm @ BHT	N/A				
Time Circulation Stopped	5 HRS				
Time Logger on Bottom	2415				
Max. Recorded Temperature	N/A				
Equipment Number	PS-1				
Location	LA				
Recorded By	SCHUMACHER				
Witnessed By	--				

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All interpretations are opinions based on inferences from electrical or other measurements and we cannot and do not guarantee the accuracy or correctness of any interpretation, and we shall not, except in the case of gross or willful negligence on our part, be liable or responsible for any loss, costs, damages, or expenses incurred or sustained by anyone resulting from any interpretation made by any of our officers, agents or employees. These interpretations are also subject to our general terms and conditions set out in our current Price Schedule.

### Comments

### Calibration Report

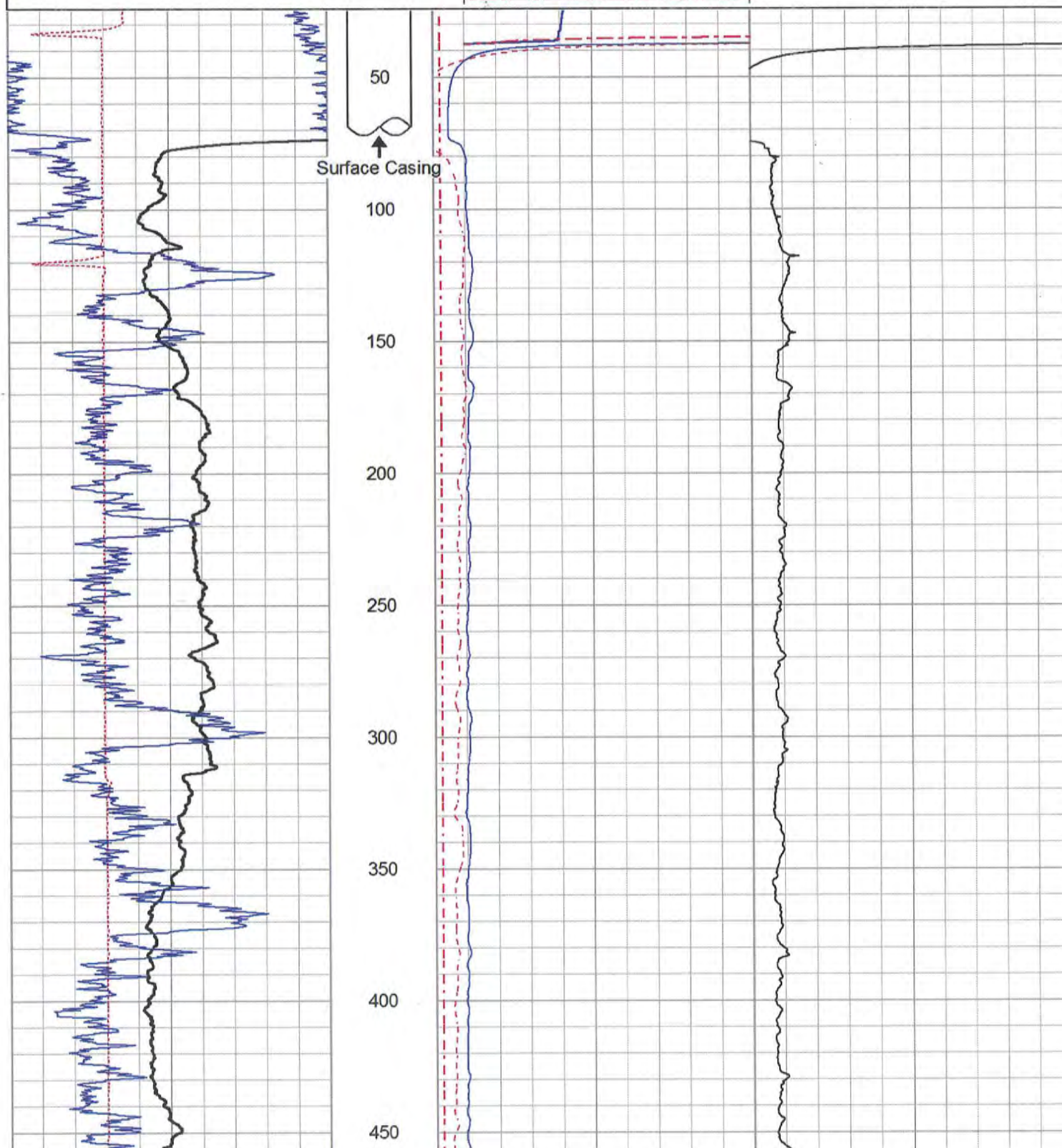
Database File 18745.db  
Dataset Pathname elog  
Dataset Creation Sun Sep 21 00:48:30 2014



Database File 18745.db  
 Dataset Pathname elog  
 Presentation Format elog  
 Dataset Creation Sun Sep 21 00:48:30 2014  
 Charted by Depth in Feet scaled 1:600

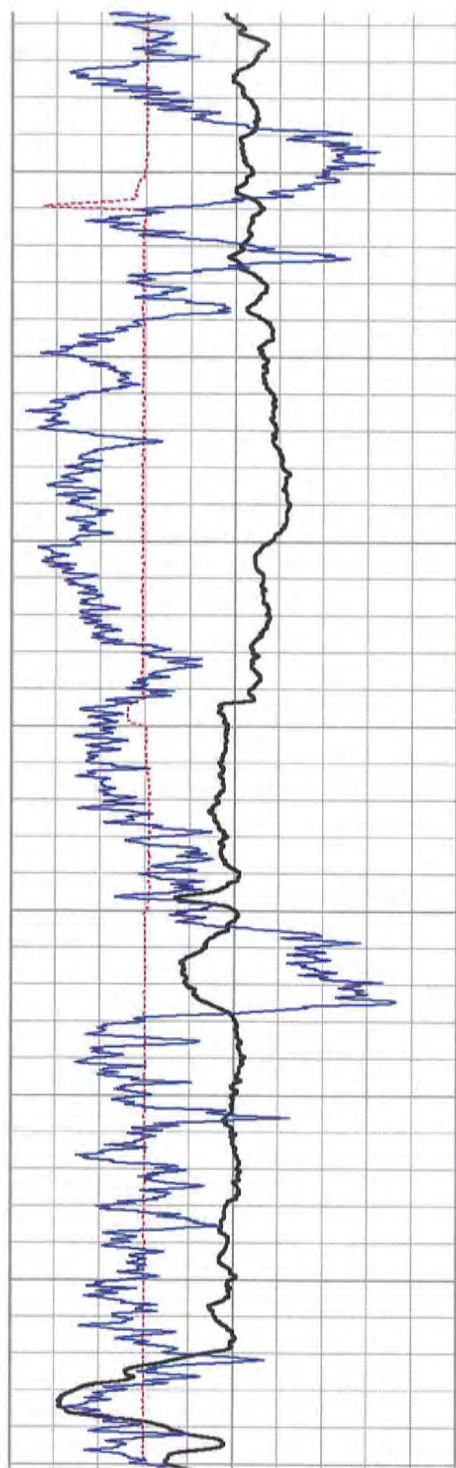
30D

30	SP (mV)	80	0	RSN (Ohm-m)	100	10	SPR (Ohm-m)	35
0	Line Speed (ft/min)	-100	0	RLN (Ohm-m)	100			
40	Gamma-Ray (GAPI)	140	0	RMF (Ohm-m)	100			
			100	RSN x 10 (Ohm-m)	1000			
			100	RLN x 10 (Ohm-m)	1000			





30D



500

550

600

650

700

750

800

850

